

A Revision of *Petraeovitex* (Verbenaceae)

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HISTORY OF THE GENUS

The genus *Petraeovitex* was founded by D. Oliver in 1883 on a specimen collected by Riedel on the island of Buru in the Moluccas, the type specimen being named as *P. riedelii* Oliv. It was then placed under the tribe Viticeae of Verbenaceae with a note that it has "an accrescent calyx resembling that of *Petraea*" (Hook. Ic. Pl. V (1883) 15, t. 1420). Briquet in Engl., Pflanzenfamilien IV. 3a. (1897) 179 removed it from Viticeae and placed it in Caryopteridoideae after *Peronema*, a position accepted by subsequent revisers of the family.

Previous to this, however, a conspecific specimen collected by Christopher Smith on the Honimoa island of the Moluccas in 1797 was named by J. E. Smith as *Petraea multiflora* (in 1814). Hence the correct name of the type species is *Petraeovitex multiflora* (J. E. Smith) Merr. (1917). In 1891 *P. pubescens* Warb. was described on a specimen collected from the Little Kai (Kai Kechil).

For a long time the genus was considered to be endemic between the Moluccas and New Guinea, until 1908 when King and Gamble added two species from Malaya and Borneo. Since then more new species have been described from Malaya, Sumatra, Borneo and the Philippines making the total number of species 10 and two varieties. In 1959 Moldenke, who reviewed these species synonymically, overlooked *P. wolfei* and reduced the remaining nine to seven species and one variety, as follows:— *bambusetorum*, *membranacea*, *multiflora*, *pubescens*, *scortechinii*, *sumatrana* and *trifoliata* and transferred var. *solomonensis* from *P. multiflora* to *P. sumatrana*. He reduced *P. ternata* and its varieties to *P. trifoliata*, a reduction that was partly made by Merrill in En. Philipp. Pl. III (1923) 406.

In the present revision the specimens referred to *P. bambusetorum* in several herbaria have been named as *P. bambusetorum* and its forma *simplicifolia* and *P. membranacea* var. *malesiana*. *P. multiflora* var. *solomonensis* has been found to be identical with the type form with no affinity to *P. sumatrana* to which it had been transferred by Moldenke. *P. pubescens* is made a variety of *P. multiflora*. In addition two new taxa have been established, namely *P. kinaluensis* and its variety *agrestis*.

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COMPARATIVE MORPHOLOGY

The species of the genus *Petraeovitex* reveal certain morphological affinities among themselves, but these are so distributed that it is hard to classify the species into definite allied groups; for many of these characters are found mixed, present in some and absent in others.

The leaves are always compound. With the exception of *P. sumatrana* and *P. multiflora* which have biternate leaves the rest of the species have ternate leaves. In the ternate leafed group, *P. scortechinii* has always densely pubescent leaves, whereas the other species are glabrous except *P. trifoliata* where the young leaves may be pubescent and adult ones often slightly hairy on the lower surface. In the biternate leafed, the young leaves in *P. multiflora* are also often pubescent notably in the var. *pubescens*.

Moreover, in Winkler No. 231: L, a tendency to produce 4, 5 and 6 leaflets to a leaf is noticed which may be an expression of its latent tendency towards the formation of biternate leaves. In addition the young leaves in *P. multiflora* may be 3-5 foliolate, though later they will divide to become biternate. Leaves in terminal inflorescences of *P. multiflora* are generally not fully developed unless the fruits are not fully mature and so the leaflets may appear sessile, to be mistaken for a form of *P. sumatrana*. (See Table I).

There are two types of inflorescences in the genus; non-specialized and specialized. The non-specialized inflorescences are found in *P. scortechinii* & *P. wolfei*; the axis here is terminal which continues its vegetative growth indefinitely. The flowers are borne on lateral cymes which later develop into vegetative branches. The bracts and bracteoles, which are coloured in these two species, also develop to become normal green leaves. The specialized inflorescences found in the rest of the species, stop at post-anthesis, their vegetative growth, and in consequence eventually die. These may be congested due to very short sub-division of their branches as in *P. trifoliata*, *P. kinabaluensis*, *P. sumatrana* and *P. multiflora* or lax due to longer and fewer sub-divisions of their branches as in *P. membranacea* and *P. bambusetorum*. Moreover, pedicels in the congested inflorescences are shorter, while in the lax, they are longer. In *P. trifoliata* and *P. kinabaluensis* which have ternate leaves, the cymes bear leafy bracts and conspicuous flowers. *P. sumatrana* and *P. multiflora* which have biternate leaves, the flowers and bracts are both smaller and inconspicuous. (See Table II).

Stamens and pistils in different species may be exserted or included. In *P. wolfei*, *P. membranacea*, *P. bambusetorum* and *P. trifoliata* they are included, while in the rest of the species they are exserted. As a rule included stamens are associated with elliptic anther lobes and exserted ones with more or less orbicular anther lobes; but *P. sumatrana* is an exception, in having exserted stamens and elliptic anther lobes. (See Table III).

TABLE I

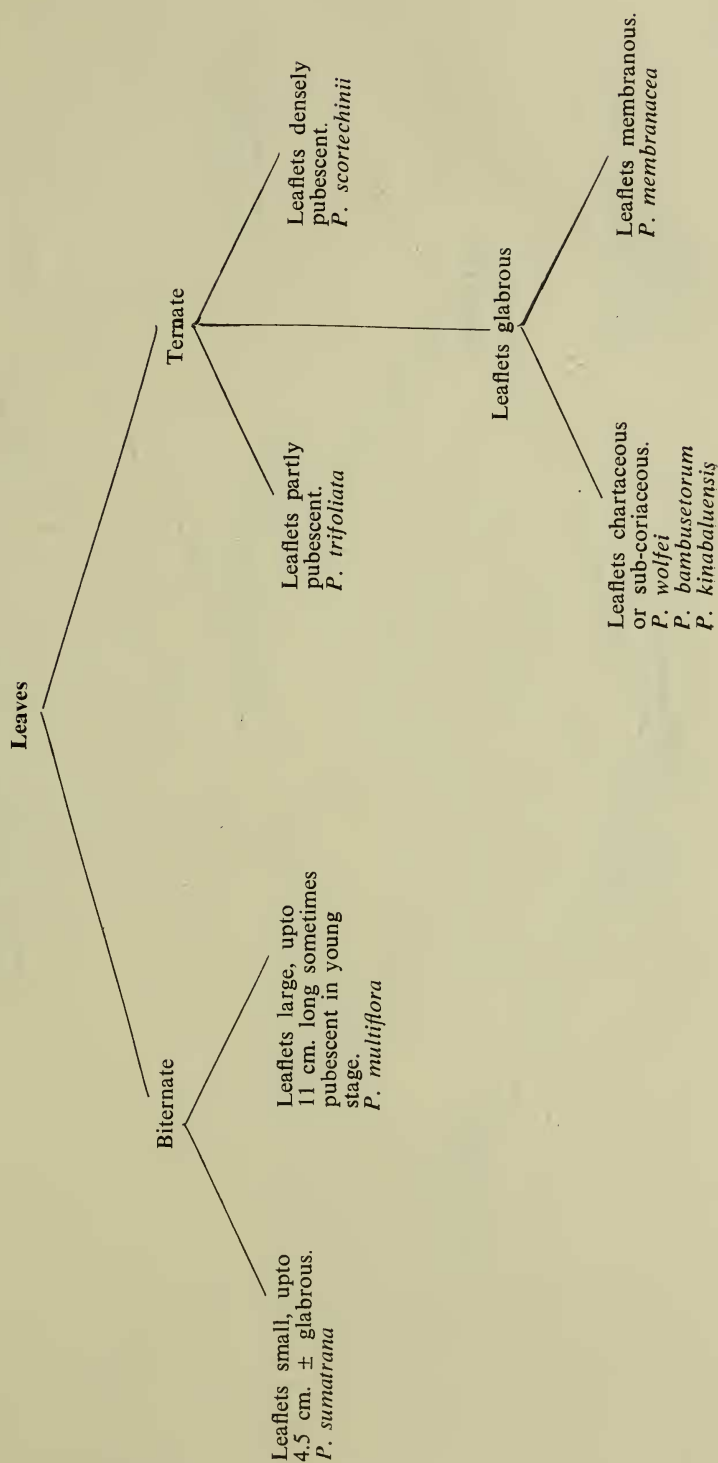


TABLE II

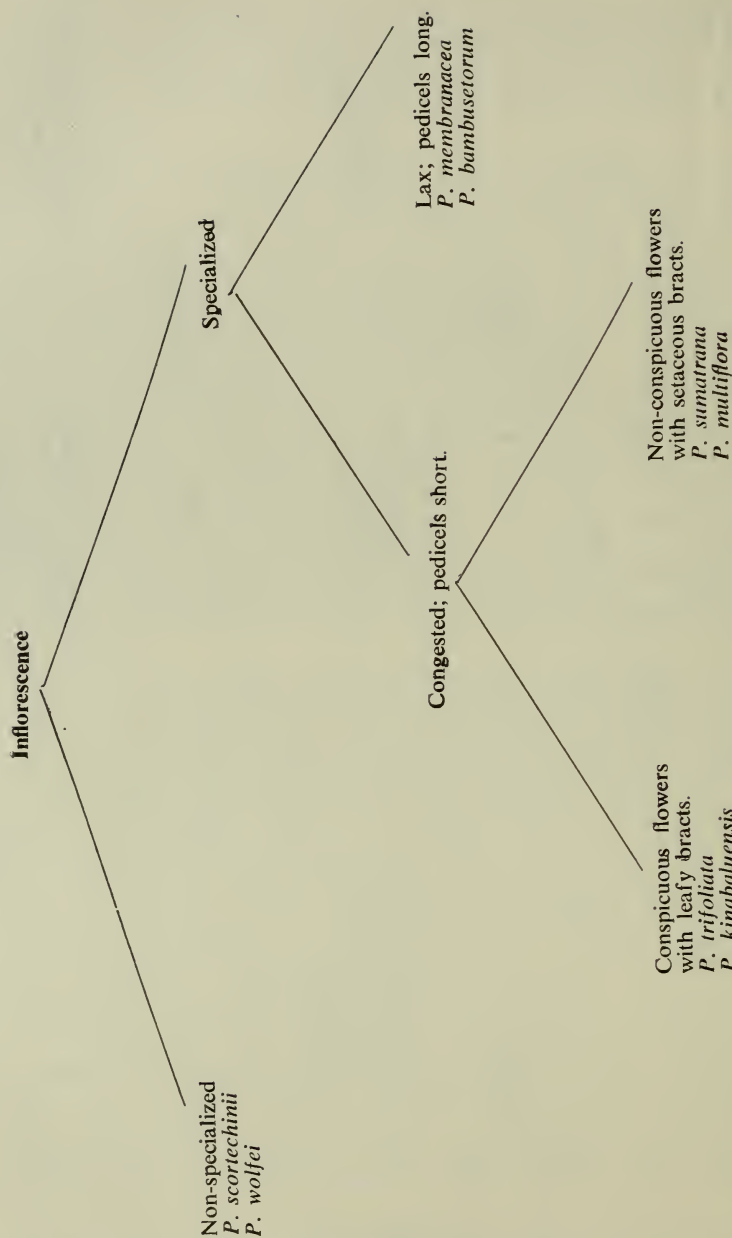
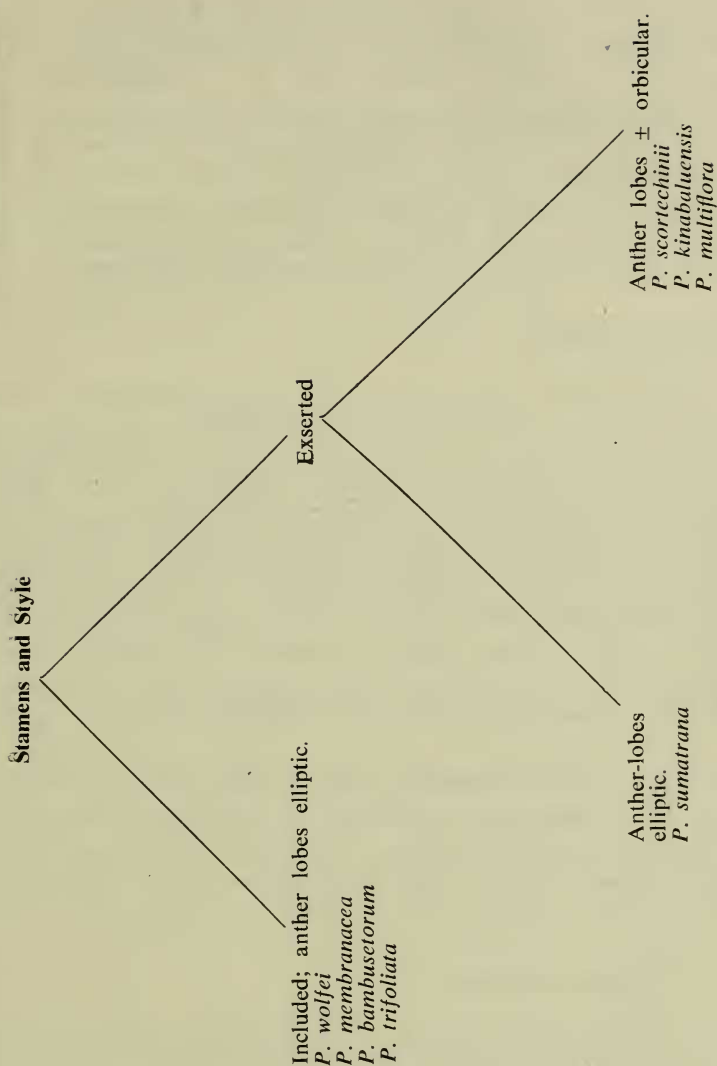


TABLE III



On the shape of fruit, the genus may be divided into two groups; (1) Fruits with conical or elongated apex and (2) Fruits with truncated apex. In *P. membranacea*, *P. bambusetorum* and *P. kinabaluensis* the fruit is with a conical apex. However, in *P. wolfei* the fruit apex is constricted at first and then produced into a short, truncated and faintly 4-lobed apex. In *P. kinabaluensis* var. *kinabaluensis* the apex is much elongated into a long neck. In *P. scortechinii*, *P. trifoliata*, *P. sumatrana* and *P. multiflora* the fruit is truncated. The truncated fruit may be almost cylindrical as in *P. scortechinii* and *P. trifoliata* or they may be four-lobed as in *P. sumatrana* and *P. multiflora*. Fruits are longitudinally striate in all species except *P. bambusetorum*. (See Table IV).

DISTRIBUTION

Geographically *Petraeovitex* is restricted to hot and moist climate of the tropics, on either side of the equator, in the region comprising what is known as "Malesia" to botanists and of Melanesia. This includes Malaysia, Indonesia, Philippines, New Guinea, Bismark archipelago upto Solomon Islands (see map 1). The trifoliolate species are found in the Malay Peninsula, the Philippines and Borneo. Of the two species which are 9-foliolate, *P. multiflora* is found in the region from the Celebes and the Moluccas eastwards to New Guinea, Bismark archipelago and Solomon Islands; no other species of *Petraeovitex* is known from this region. *P. sumatrana* is restricted to Sumatra and Borneo only (see map 2).

P. scortechinii and *P. wolfei* are endemic in the central and northern parts of the Malay Peninsula whereas *P. membranacea* and *P. bambusetorum* are found in the Malay Peninsula and Borneo (see map 3). Similarly, *P. trifoliata* has also been collected from Borneo, Sarawak and the Philippines while *P. kinabaluensis* is so far known only from North Borneo. (See map 4).

ACKNOWLEDGEMENT

I wish to record here my gratitude to the following: to the Government of Singapore for granting me the Colombo Plan Fellowship which enabled me to undertake this piece of research work; to Mr. H. M. Burkill, Director of Gardens, Singapore, and to Dr. Chew Wee-lek, Keeper of the Herbarium, for putting at my disposal the facilities of the Singapore Botanic Gardens; to Dr. C. X. Furtado, for guidance and assistance in translating Latin and German descriptions and in preparing the diagnoses in Latin of the new taxa; to Dr. H. N. Moldenke for the generous gifts of his valuable literature and to Che Juraimi bin Samsuri for making the drawings published here.

I also wish to thank the Directors and Curators of the following herbaria for the loan of herbarium specimens:

1. Arnold Arboretum, Harvard University, 22 Divinity Avenue, Cambridge 38, Massachusetts, U.S.A. (A).
2. Botanisches Garten und Museum, Berlin-Dahlem, Germany. (B).
3. British Museum of Natural History, London, S.W.7, England. (BM).
4. Botanic Gardens, Brisbane, Queensland, Australia. (BRI).
5. Botanic Gardens, Calcutta, India. (CAL).
6. Royal Botanic Garden, Edinburgh, Scotland. (E).
7. Royal Botanic Gardens, Kew, England. (K).
8. Forest Research Institute, Kepong, Selangor. (KEP).
9. Rijksherbarium, Leiden, Netherland. (L).
10. Forest Herbarium, Lae, New Guinea. (LAE).
11. Forest Herbarium, Sandakan, North Borneo. (SAN).

PETRAEOVITEX Oliver

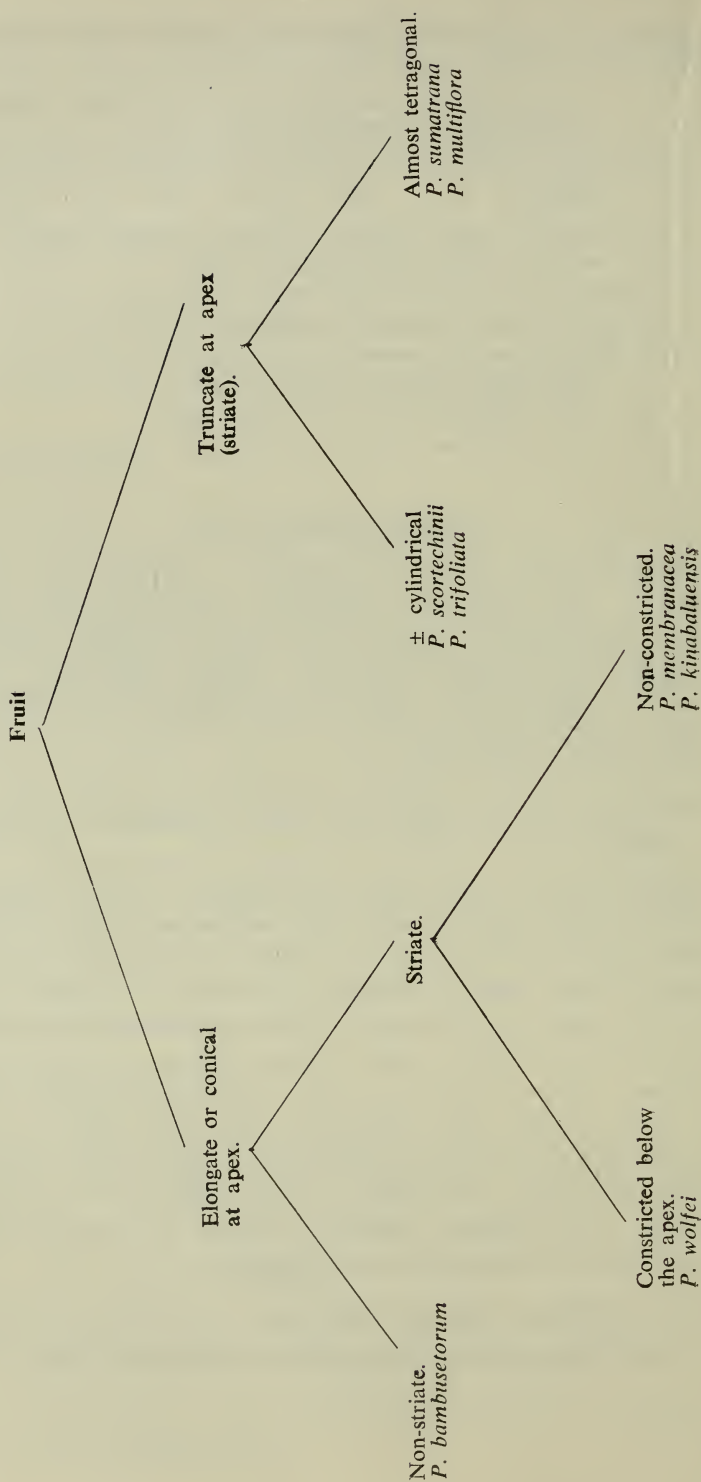
PETRAEOVITEX Oliver in Hook., Ic. Pl. 5 (1883) 15, t. 1420; Warb. in Engl., Bot. Jahrb. XIII (1891) 427; Engl. and Prantl, Nat. Pflanzenf. IV. 3a (1897) 179; King and Gamble, Mat. Fl. Malay. Pen. IV (1909) 1068; Hall. f., Med. 's Rijks Herb. Leid., No. 37 (1918) 84; Lam., Malay. Verb. (1919) 323 and Bull. Jard. Bot. Buit. III (1921) 97.

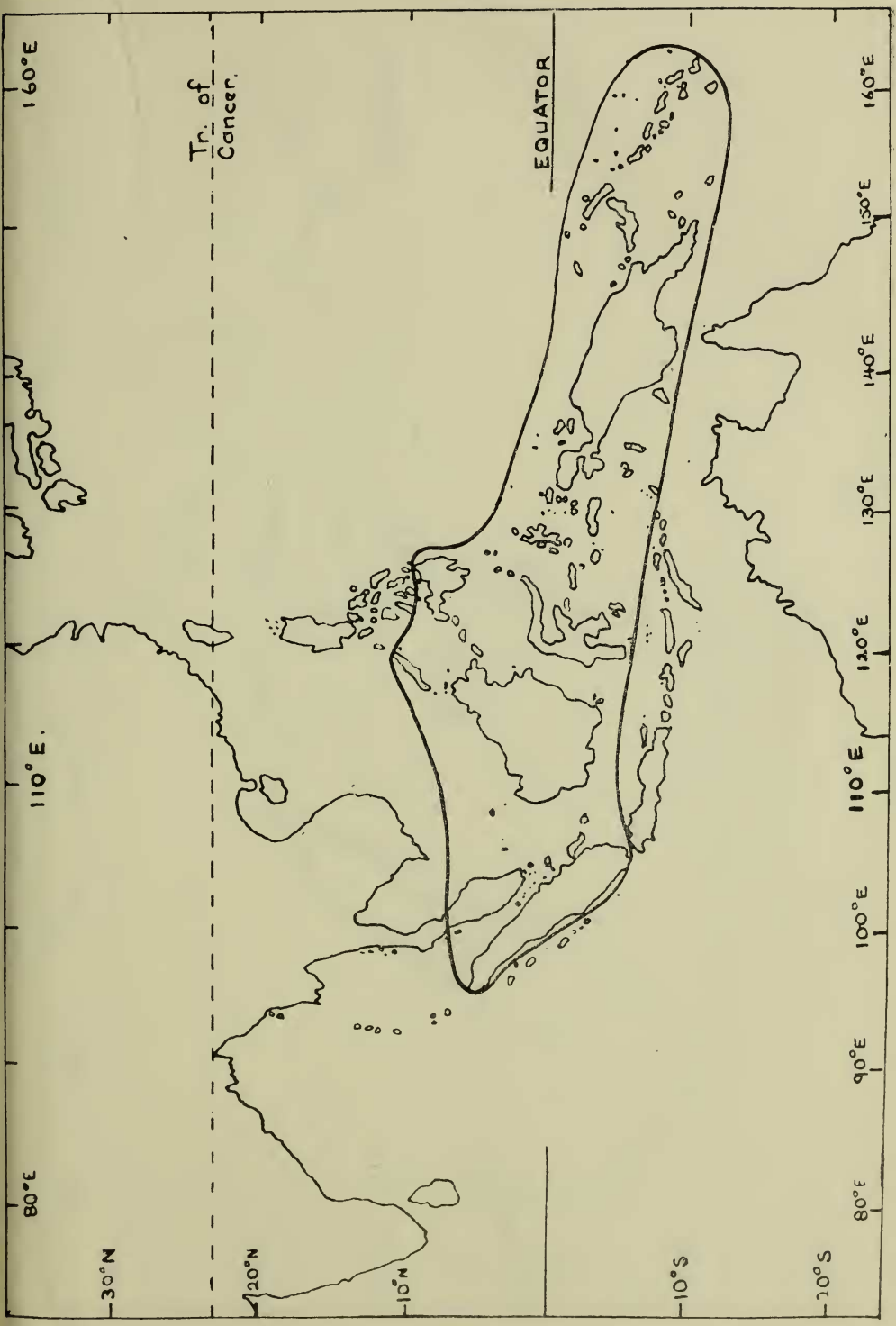
TYPE SPECIES: *P. riedelii* Oliv. (= *P. multiflora* (J. E. Smith) Merr.).

Woody climbers; branches quadrangular. *Leaves* opposite, ternate or biternate, rarely simple. *Inflorescence* terminal or axillary, cymose panicles with spreading branches; bracts leafy, linear or minute. *Flowers* shortly pedicelled. *Calyx* short, 5-toothed, campanulate; lobes much accrescent in fruit, membranous, reticulate. *Corolla* oblique, 2-lipped; lobes 5, subequal. *Stamens* 4, epipetalous, subequal, almost didynamous, exsert or included, alternate with the corolla lobes; anthers dorsifixed, anther lobes elliptic-oblong or orbicular. *Ovary* obovoid, imperfectly 2-celled, cells 2-ovuled; ovules pendulous; style slender; stigma bilobed, lobes equal or unequal. *Fruit* capsular, conical or truncate at apex, narrowed towards the base. *Seeds* 2 or 1, exalbuminous.

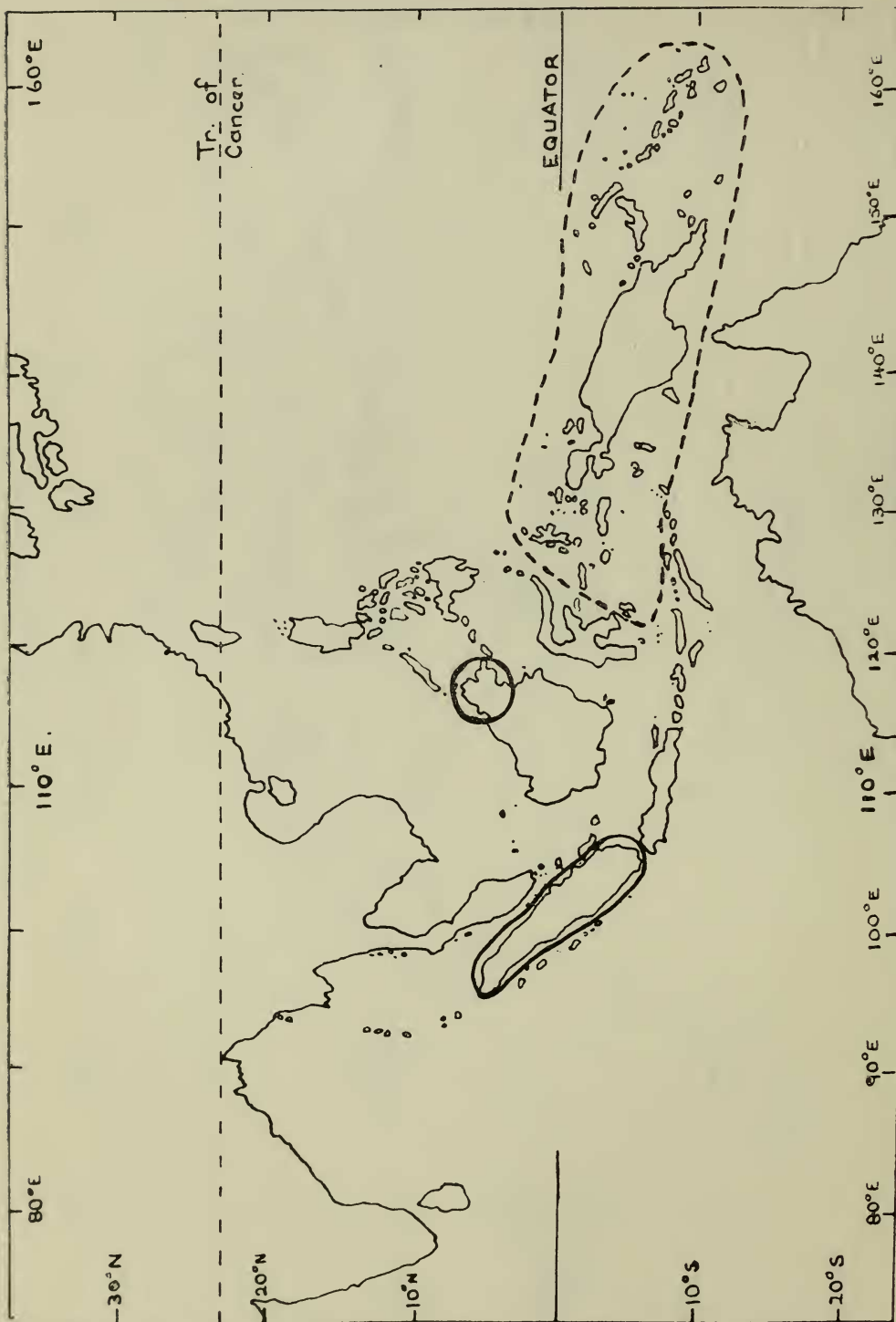
DISTRIBUTION: Malaysia, Philippines, Indonesian Archipelago. New Guinea, Bismark Archipelago and Solomon Islands.

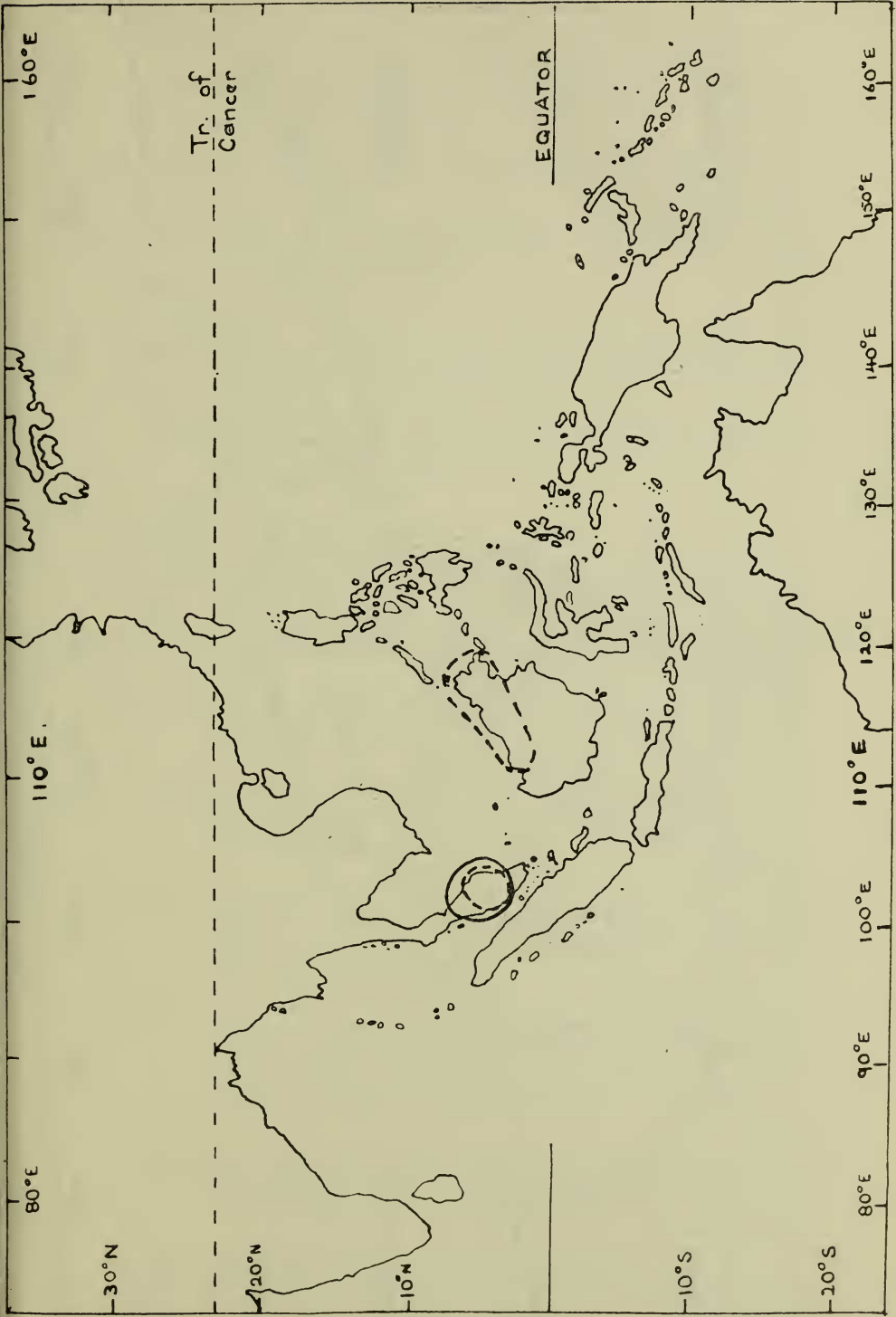
TABLE IV



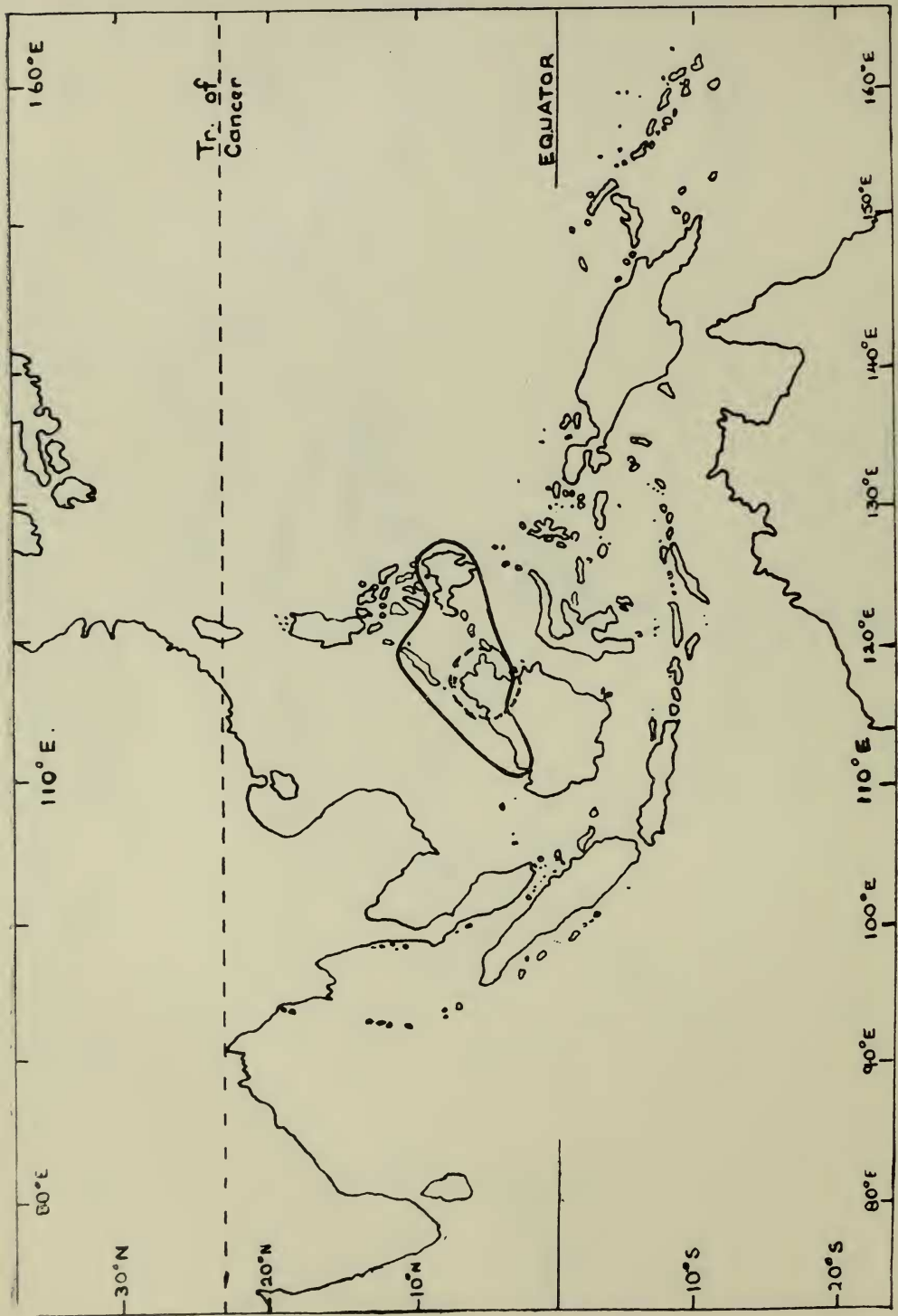


Map 1. Distribution of genus *Petracovites* Oliver.





Map 3. Distribution of: *P.scortechinii* & *P.wolfei* (—); *P.membranacea* and *P.bambusetorum* (---).



Map 4. Distribution of: *P. trifoliata* (—); *P. kinabaluensis* (----).

KEY TO THE SPECIES

1. (a) Flowers in cymes, borne on specialized flower-bearing branches or inflorescence with or without green or ash coloured bracts ... 3.
(b) Flowers in short axillary cymes towards the end of growing non-specialized branches, (leaves 3-foliolate); young axillant leaves and bracts coloured yellowish 2.
2. (a) Flower: stamens and style exserted; anther lobes $\pm$ orbicular; fruit striate, slightly enlarged at apex. Leaves densely pubescent
P. scortechinii.
(b) Flowers: stamens and style included; anther lobes elliptic; fruit striate, constricted above the middle. Leaves glabrous (fruiting calyx largest in the genus) **P. wolfel.**
3. (a) Leaves biternate 10.
(b) Leaves 1 or 3-foliolate 4.
4. (a) Inflorescence with many leaf-like bracts and ultimate branchlets with many linear bracteoles even without axillary flowers; pedicels $\pm$ 5 mm. long; flowers many, congested on peduncle or branchlets 8.
(b) Inflorescence with few or no leaf-like green bracts; branchlets divaricated; flowers diffused, non-congested; pedicels 5-10 mm. long (anther lobes elliptic) 5.
5. (a) Fruit striate 7.
(b) Fruit non-striate 6.
6. (a) Leaves 3-foliolate; leaflets ovate, main pair of nerves upto 4; fruit with arcuately conical apex; fruiting calyx brownish, hairy or glabrous **P. bambusetorum.**
(b) Leaves simple, elliptic-ovate, main pair of nerves upto 6; fruit abruptly obtusely acuminate; fruiting calyx green, sparsely puberulous **P. bambusetorum forma simplicifolia.**
7. (a) Inflorescence about 12 cm. long; leaflets membranous, dull above, rounded at base; intramarginal nerve obscure; side petiolules upto 7 mm.; pedicels $\pm$ 10 mm. long; fruit glabrous
P. membranacea var. membranacea.
(b) Inflorescence 30-70 cm. long; leaflets chartaceous or subcoriaceous, dull or nitid on both sides, rounded-cuneate at base; intramarginal nerves prominent; side petiolules upto 4 mm.; pedicels $\pm$ 5 mm. long; fruit sparsely puberulous towards apex ... **P. membranacea var. malesiana.**
8. (a) Fruit shortly conical at apex or suddenly narrowed into a long neck; style always terminal; stigma equally bilobed; ovary pubescent only in the upper 3rd, non-glandular; stamens and style much exserted (longest in the genus); anther lobes $\pm$ orbicular. Leaves glabrous 9.
(b) Fruit rounded at apex when young, later truncate, depressed at summit; style apical when young, excentric at anthesis; stigma unequally bilobed; ovary pubescent and often glandular; stamens and style slightly exserted; anther lobes elliptic. Leaves glabrous or partly puberulous beneath, rarely irregularly dentate and deciduously pubescent beneath (probably in early stage)
P. trifoliata.
9. (a) Leaflets rhomboidally elliptic, shining on both surfaces, generally longer and acuminate in the upper half, cuneate at base or almost so; middle leaflet upto 15 cm. and its petiole upto 3.5 cm. long; fruit suddenly narrowed into a long neck **P. kinabaluensis var. kinabaluensis.**
(b) Leaflets elliptic-ovate, dull, generally rounded at base, sometimes sub-cordulate; middle leaflet upto 11 cm. and its petiolule upto 2.5 cm. long fruit shortly conical at apex **P. kinabaluensis var. agrestis.**

10. (a) Calyx lobes tomentose without, glabrous within (except var. pubescens); corolla villous in the throat; stamens and style subequal or nearly so; anther lobes rounded 11.
- (b) Calyx lobes tomentose on both surfaces; corolla glabrous within; style nearly twice exerted as the stamens; anther lobes oblong or elliptic; (largest leaflet $\pm$ 4-4.5 cm. long) **P. sumatrana.**
11. (a) Leaflets glabrous, entire, (largest leaflets $\pm$ 10-11 cm. long); calyx lobes glabrous within **P. multiflora** var. **multiflora.**
- (b) Leaflets pubescent on both surfaces, often irregularly dentate; (largest leaflets $\pm$ 4-4.5 cm. long); calyx lobes puberulent within **P. multiflora** var. **pubescens.**

DESCRIPTION OF SPECIES

Petraeovitea scortechinii King & Gamble in Kew Bull. (1908) 113 & Mat. Fl. Malay. Pen. IV No. 21 (1909) 1068; Lam., Malay. Verb. (1919) 329 & in Bull. Jard. Bot. Buit. III (1921) 99; Ridl., Fl. Malay. Pen. II (1923) 637; Mold., Résumé Geogr. Distrib. & Syn. (1959) 180, 332 & 333. **Fig. 1.**

TYPE SPECIMEN: Perak (Scortechini 753 or 1753 — K, not seen).

Among the species that bear yellowish-coloured young leaves, bracts and bracteoles on the flower bearing branches, this species is easily distinguished by its pubescent leaves, exerted stamens and styles, rounded anther lobes, villous ovary in the upper part, and pubescent, non-constricted fruit which is gradually enlarged towards the apex.

A liana; young branchlets pale brown, puberulous; innovations tawny-pubescent. *Leaves* opposite, membranous, trifoliolate; end leaflet ovate, shortly and obtusely acute at apex, rounded or slightly cuneate at base; 5-8 by 2.5-5 cm.; upper surface puberulent, lower grey-pubescent; margins entire or undulate; main nerves 4 pairs, curving sharply upwards; side leaflets similar but rather smaller and somewhat unequally cordate at base; petiole 3.8-6 cm. long, petiolules of end leaflet 1.2-2 cm. long, of side leaflets 0.5-1 cm. long; all fulvous pubescent. *Inflorescence*: flowers in short decussate cymes on young, terminal portion (15-30 cm. long) of the branches or branchlets; cymes dichotomously branched, one in the axil of young coloured or green leaf, 3-5 cm. in length; bracts almost orbicular when young, elliptic or clavate later, 13-19 mm. long; pedicels short. *Calyx* fulvous-pubescent, 4-5 lobed; lobes up to 12 mm. long. *Corolla* 2-lipped, 15-20 mm. long; lobes spatulate, concave, 2-4 mm. long. *Stamens* 4, exerted, the 2 lower ones being longer than the two upper; filaments 6-8 mm. long. *Ovary* cylindric, villous at apex, hairy lower down, 2-celled, 2 mm. long; style exerted, up to 15 mm. in length; stigma 2-lobed, the lobes spreading. *Fruiting calyx* 19-25 mm., 3-nerved, reticulate. *Fruit* capsular, broader, obtuse and pubescent towards apex, narrowed towards the base, ribbed, 6-7 mm. long.

MALAYA: **Perak** (Scortechini s.n.: CAL). **Selangor**, 16th mile at Ulu Gombak (Symington 44,082: KEP; Mohamed Nur 34,212: SING, L & A; Munir 2: SING). **Negri Sembilan**, Sungei Ujong (Alvins 1,858: SING).

Moldenke (op. cit. p. 170 & 193) includes also Malacca and Borneo in the distribution of this species, but so far no specimens from these two states were found among the specimens examined by me from different herbaria. Lam also includes Malacca.

Inflorescences produced on old wood in the axils of fallen leaves seem to differ somewhat from those described as normal; for the former are apparently specialized, limited branches of about 10–15 cm. long and two or more branches may grow from the same pulvinus. Unfortunately Scortechini s.n. in CAL is in a bad state of preservation to permit a further study. This specimen might be an un-numbered duplicate of the type.

Some young flowers show trilobed stigmata, but in adult stages examined, the latter were always bilobed.

Petraevitex wolfei Sinclair in Gard. Bull. Sing. XV (1956) 18; fig. 2; Turrill Curt. Bot. Mag. CLXXIII (1960) Tab. 355. **Fig. 2.**

TYPE SPECIMEN: Kedah (Wolfe & Kadir 21,452 — SING).

Allied very closely to *P. scortechinii* in having yellowish young leaves, bracts and bracteoles in flower-bearing branches, puberulous calyx within and without, ovary puberulent towards apex and longitudinally striate fruit, but is distinguished easily by its glabrous leaves, non-exserted stamens, elliptic anther lobes, unequally bilobed stigma and fruit faintly 4-lobed at the apex and prominently constricted above the middle.

A long woody climber. *Leaves* trifoliate; leaflets elliptic or elliptic-ovate, shortly acuminate at apex, $\pm$ rounded or slightly cuneate at the base, 9–17 cm. long, 4–8 cm. broad, membranous, glabrous; nerves 4–6 pairs, prominent in lower surface, reticulate; petioles upto 8 cm. in length; petiolules 5–20 cm. long. *Inflorescence* thyrsoid, handsome golden yellow in colour, pendulous, old up to 50 cm. long; cymes axillary, opposite, decussate, 2–5 cm. long, with 2–3 flowers; bracts leafy, broad elliptic-oblong, 0.8–3 cm. long; pedicels short, $\pm$ 3 cm. long. *Calyx* 1.8–2.2 cm. long, puberulous without, deeply 5-lobed. *Corolla* falcate, deciduous, pale yellow, 2.2–2.5 cm. long; lobes 5, obtuse, 4–5 mm. long, 3–4 mm. broad. *Stamens* 4, included, two 12–13 mm. long, the other two 10 mm. long; anther 0.8–1 mm. long. *Ovary* ellipsoid-oblong, 3.5 mm. long, slightly constricted and minutely hairy in the upper third; style slender, 2–2.3 cm. long, glabrous; stigma unequally bifid. *Fruiting calyx* 3–4 cm. long, with fairly conspicuous midrib and close reticulate venation. *Fruit* capsular, 8 mm. long, longitudinally ribbed below the constriction, minutely puberulent and faintly 4-lobed towards the apex.

MALAYA: **Kedah**, Sungai Patani, Selambau-Jeniang Road (Wolfe & Kadir 21,452 — Holotype & Isotype: SING; Kiah 35,972 — Paratype: SING, & Paratype E; Wolfe s.n.: SING; Munir 1: SING). **Trengganu**, Dungun — Paka Road, Bukit Bauk (Sinclair 39,901 — Paratype: SING; & Paratype: L). **Kelantan**, Mak Mek Nal (Symington 37,971: KEP). **Singapore**, Cult. Bot. Gard. (Furtado 37,440: SING).

Generally the cyme is dichotomous at the first division, with apical bud developed into flower and fruit; but the subsequent branching is very irregular due to the suppression of flowers and some branches and persistence generally of only one bracteole at each division (Fig. 2-D).

This species bears the largest fruiting calyx in the whole genus.

The figure given by J. Sinclair was drawn from the fresh specimens of the plant cultivated in Singapore Botanic Gardens; this plant does not fruit, and produces leaves which are somewhat different in shape and texture from the ones in its natural habitat.

Petraeovitex membranacea Merr. in Journ. Malay. Br. Roy. As. Soc. 1 (1923) 30; Mold., Résumé Geogr. Distrib. & Syn. (1959) 192: var. **membranacea**. Fig. 3.

TYPE SPECIMEN: Borneo, Sabah (Ramos 1,372 — PNH? not seen; Isotype in K & A).

Regarding its peculiar mode of inflorescence associated with striate fruits, this species has no very close allies, but it comes nearer to *P. bambusetorum* in having: lax, dichotomously branched inflorescence, long pedicelled flowers, almost included stamens and style, elliptic anther lobes and glabrous corolla tube.

A slender woody climber. *Leaves* 3-foliolate, membranaceous; petiole 4–6 cm. long; leaflets entire, ovate-oblong to ovate-elliptic, acuminate, usually rounded at base, rarely cuneate, glabrous 4–5 nerved on each side with a faint intramarginal nerve looping from the middle upwards; reticulation faint especially above; middle leaflet largest, 6–11 cm. long, 3–5.5 cm. broad, petiolule 1–2 cm. long; lateral leaflets 5–8 cm. long, 2.5–4.2 cm. broad, petiolule 3–7 mm. long. *Inflorescence* exillary, paniced, bearing lax cymes, 9–12 cm. long, 6–9 cm. broad, puberulent, striate in the rachis; primary branches (in the specimens seen) two on each side of the rachis; the lowest one in Isoholotype 2.5–3.5 cm. long, in Isoparatype $\pm$ 5 cm. long; bracts absent; bracteoles linear, minute upto 1 mm. long. *Flower*: pedicels 8–10 mm. long. *Calyx* 5–6 mm. long, puberulous without, glabrescent within. *Corolla* obscurely 2-lipped; lobes subequal, puberulent on the back and margins, ovate to elliptic-ovate, obtuse, 3.5 mm. long, 2–2.5 mm. broad; tube glabrous within and without, 3.5 mm. long. *Stamens* 4, included, subequal; filaments with very few glandular hairs near the base; anthers ellipsoid, 1.7 mm. long. *Ovary* oblong, later slightly cuneate towards

base, obscurely puberulent in the upper third; style long, non-exserted; stigma unequally 2-lobed. *Fruiting calyx*: tube 8 mm. long, strongly ribbed; lobes oblong, acute, membranous, 3-nerved, reticulate, minutely puberulent on the back and margins, about 15 mm. long, 4 mm. broad. *Fruit* glabrous, broader, in the upper third, longitudinally striate, 8 mm. long.

BORNEO: **Sabah**, Sandakan (Ramos 1,372 Isotype: A & K, & 1,679 — Paratype: L).

Merrill described this species as having a very lax inflorescence, but this is not exclusive in this species, for *P. bambusetorum* has similarly lax inflorescence. He also mentions that this species bears leafy bracts about 1 cm. long, axillant to the lower primary branches of inflorescences, but they are not present in the specimens examined. Moreover the inflorescences are very short, $\pm$ 12 cm. long, never reaching 25 cm. long as originally described. Large inflorescence with leafy bracts are noticed in var. *malesiana*.

Petraeovitex membranacea Merr. var. *malesiana* Munir var. nov.

Fig. 4 & 5 *P. bambusetorum* sensu Lam op. cit. (1919) 328 & (1921) 98 quoad specimen Haviland & Hose 1,913E infra citatum.

TYPE SPECIMEN: Sarawak (Haviland & Hose 1,913B — BM).

A var. *membranacea* hęc varietas foliolis crassioribus, magis nervatis, inflorescentia laxiore longioreque, bracteis interdum foliaribus lobis tuboque calycis intus puberulentibus, floribus breviter pedicellatis, ovario fructuque apice puberulentibus differt.

Differs from *P. membranacea* var. *membranacea* in having: leaflets slightly thicker and with main pairs of nerves up to seven; inflorescence more lax and much longer bearing sometimes leafy bracts in early stages; calyx also puberulent in the lobes and tubes within; pedicels slightly shorter and ovary and fruit puberulent towards apex.

MALAYA: **Pahang**, Sungei Lembing, Kuantan (Symington & Kiah 27,765A: SING, KEP. Petals pale yellow). **Selangor** loc. incert. (Hume 7,877: SING).

BORNEO: **Sarawak**: Mount Singhi (Haviland & Hose 1,913B — Holotype: BM & 1,913E: L).

Selangor specimen bears slightly thicker leaflets and is in fruit, but is devoid of bracts, while the Pahang specimens are in flower with leafy bracts and too thin leaflets. It seems that the latter is collected from young apical branch whereas the former is from older branch. Haviland & Hose 1,913E has been confused with *P. bambusetorum* (Lam l.c.) to which it has great resemblance in general appearance, but from which it differs in having its fruit longitudinally striate.

Petraeovitex bambusetorum King & Gamble in Kew Bull. (1908) 113 & Mat. Fl. Malay. Pen. III No. 21 (1909) 1069; Lam, Malay. Verb. (1919) 328 & Bull. Jard. Bot. Buit. III (1921) 98, p.p. excl. Haviland & Hose No. 1,913E; Merr., En. Born. Pl. (1921) 518, p.p. excl. Clemens No. 10,246; Ridl., Fl. Malay Pen. II (1923) 637; Mold., Résumé Geogr. Distr. & Syn. (1959) 180, 192 & 193; forma **bambusetorum**. Fig. 6 & 7.

TYPE SPECIMEN: Perak (kunstler 8,765 Lectotype — K, not seen; Isolectotype — CAL).

Typification

P. bambusetourm was adopted by King and Gamble to show that the species was found in the bamboo forest of Perak in Malaya, but as the flowers of the type were small, the specimen was compared with Bornean specimens and a mixed description was drawn for the species. Though the syntypes are apparently conspecific, there is no certainty that there may not be some differences of infra-specific nature, since there are no mature flowers in the Bornean specimens and there seems to be also some variations in the leaves. Thus Haviland 1,913 (a syntype) has been separated here as a *forma* because of its simple, undivided leaves, and Kunstler 8,765 (in Kew) has been selected as the lectoholotype with isolectotype in Calcutta herbarium.

P. bambusetorum in its both forms is similar to *P. membranacea* in having lax and dichotomously branched inflorescences, with long pedicelled flowers, and with stamens and style almost included, but differs in having non-striate fruit.

A lofty woody climber; branchlets smooth, pale brown. *Leaves* 1 or 3-foliolate; leaflets ovate-oblong, acuminate, rounded-cuneate at base, entire, chartaceous, glabrous, 4–6 rarely 7 or 8 nerved; petiole upto 4.5 cm. long; midleaflet 7–10 cm. long, 3–5.8 cm. broad, petiolule 1–2.5 cm. long; lateral leaflets 6–9 cm. long, 2.5–4.3 cm. broad, petiolule 5–10 mm. long. *Inflorescence* axillary and terminal with or without leaves, or in axils of fallen leaves, a cymose panicle, lax, upto 30 cm. long; bracts leafy, lanceolate, long acuminate, deciduous; bracteoles minute, setulose. *Flowers* divaricated, non congested; pedicels of flower buds 4 mm. long, puberulous. *Calyx* 5-lobed, $\pm$ 5 mm. long in bud; tube 3 mm. long, puberulous without, glabrous within; lobes 2 mm. long, puberulous within and without. *Corolla* 5-lobed, about 6 mm. long, glabrous within, 2-lipped, the upper lip 2-lobed, the lower 3-lobed; lobes elliptic-ovate, incurved, $\pm$ 4 mm. long, puberulous in the margins and on midlength without. *Stamens* 4, subequal, $\pm$ 4 mm. long; filaments glabrous; anther lobes elliptic-oblong. *Ovary* orbicular-ellipsoid when young, sparsely puberulent at apex; style long, slightly exserted (in Ridley 9,065); stigma unequally 2-lobed. *Fruiting calyx* 2–2.6 cm. long; tube 6–8 mm. long, faintly ribbed outside; lobes oblong, membranous, 3-nerved, reticulate, sparsely

puberulent, 1.3–1.9 cm. long, 3–5 mm. broad. *Fruit* glabrous, broader in the upper third, cuneate towards base, non-striate, $\pm$ 7 mm. long.

MALAYA: **Perak**, in dense bamboo forest near Ulu Kerling (King's Collector 8,765 Isolectotype: CAL.

BORNEO: **Sabah**, Sandakan (Ridley 9,065 Syntype: SING).
Sarawak, loc. incert. (Ridley s.n.: K).

A careful study of the syntypes of *P. bambusetorum* (exclusive Haviland 1,913) showed that though they are specifically identical, there is some difference in regard to the origin of inflorescences. In syntype Kunstler 8,765 the inflorescences arise from a thick, woody, abbreviated branches or warts formed in the axils of old fallen leaves on stem. These warts seem to become periodically active so that they show the vestiges of old inflorescences that have ceased to exist. Presence of bracts and bracteoles show that these inflorescences have not grown up fully. Such a mode of producing flowers has also been noticed in *P. scortechinii* and is probably confined to old wood only.

In Ridley 9,065 & Haviland 1,913, however, the infructescences are borne on new growth of the year and in Haviland 1,913 are both axillary and terminal, whereas in Ridley 9,065 they are axillary (terminal portion not seen). In Kunstler 8,765, the panicles with leaves may be said in a certain sense to be terminal.

King and Gamble in their protolog of *P. bambusetorum* has described the leaflets with 8 pairs of main nerves and petiolules upto 0.5 inch long, but in the type specimens the main pairs of nerves in the leaflets are 4–6, rarely 7 or 8 pairs, that is if the faint, indistinct nerves toward the apex are included. The maximum length of petiolules in Kunstler 8,765 is the same as in the original description, but mid-petiolules in Ridley 9,065 (two specimens) are double the length, because in the latter the leaves are fully developed. The petiole in the leaves (simple) of Haviland 1,913 is also double the length given. Flowers in Kunstler 8,765 are very young, and so the pedicels were described as “very short”; but in the infructescences of Ridley 9,065 (& Haviland 1,913) the pedicels are up to 1 cm. long. Corolla is sparsely puberulent without and not glabrous as originally described. Calyx in flower is puberulent outside and in the lobes within, a character is retained also in fruiting calyx, though not mentioned in the original description.

Petraeovitex bambusetorum K. & G. forma **simplicifolia** Munir f. nov. Fig. 8.

TYPE SPECIMEN: Sarawak (Haviland 1,913 — K).

A forma typica foliis indivisis, ad 6 usque utrinsecus nervatis differt.

Differs from *P. bambusetorum* forma *bambusetorum*: in having simple, undivided leaves with mainpairs of nerves (usually) upto

6. Infructescence botryoidal in general appearance and fruit abruptly acuminate, apex obtuse; bracts and bracteoles absent.

BORNEO: **Sarawak** Mt. Po (Haviland 1,913 — Holotype: K, Isotype: CAL).

King and Gamble (Mat. Malay. Fl. 1909) doubted about the Haviland 1,913 as being conspecific with other syntypes, but the presence of identical nerves of fruiting calyx and the apparent similarity of the leaves (simple) to the leaflets of the other syntypes made them to take these specimens as one and the same species. However, Haviland 1,913 differs from other syntypes in having not only simple leaves, but also in more veins to the leaves. Presence of simple leaves seems to be a stable character as there is no sign of their side 'acolytes'. In view of this I have separated it as a *forma*.

Petraeovitex kinabaluensis Munir sp. nov. var. **kinabaluensis**.
Fig. 9.

TYPE SPECIMEN: Borneo, Sabah (Clemens 40,561 — K).

A P. trifoliata cui affinisissima praecipue in bracteis bracteolisque inflorescentiae folioribus et floribus congestis, haec species corolla tubo longiore, staminibus styloque multo exsertis, lobis antheri fere orbicularibus, ovario eglanduloso, stylo centrico, fructus apice elongato-conico differt.

Akin to *P. trifoliata* in having inflorescences bearing leafy bracts and bracteoles and closely placed flowers but differs in much longer corolla tube, much exserted stamens and style, $\pm$ rounded anther lobes, non-glandular ovary and elongated conical apex of the fruit.

A woody climber up to 50 ft. long; branchlets smooth, pale-brown. *Leaves* 3-foliate; petiole 5–7 cm. long; leaflets elliptic, usually acuminate, cuneate at base, entire, nitid, chartaceous, glabrous; nerves 4–6 on each side, lower ones prominent, slightly concurrent with the midrib, then porrect; intramarginal nerve faint, united above the middle; reticulations prominent beneath; middle leaflet largest, 10–15 cm. long, 3–6 cm. broad, petiolule 2.5–3.5 cm. long; lateral leaflet 8.5–11.5 cm. long; 3–4.5 cm. broad, petiolule 5–10 mm. long. *Inflorescence* axillary, a cymose panicle, 15–25 cm. long, 3.5–6 cm. through, puberulous in the axis, pedunculiform and bare at base; flower bearing branches are shortly and porrectly subdivided; bracts leafy, puberulous, soon glabrous, generally spatulate at first, later elliptic, acuminate; basal ones larger, 3–4 cm. long, the upper ones 1–2.5 cm; bracteoles linear 2–8 mm. long, puberulous. "Flowers pure yellow" (fide notes), pedicels short, puberulous. *Calyx* 5-lobed, puberulous within and without, 4–6 mm. long. *Corolla* 5-lobed, puberulous without, and sparsely so on the lobes within; tube glabrous within, 10–12 mm. long; upper lip 2-lobed, the lower 3-lobed; lobes 4–5 mm. long, 2–3 mm. broad. *Stamens* 4, subequal, much exserted; filaments

seated in the throat, sparsely hairy near the base, 15–18 mm. long; anthers $\pm$ rounded, about 0.4 mm. long. Ovary oblong, later conical towards apex, pubescent in the upper third; style 20–25 mm. long, filiform, glabrous, much exserted; stigma 2-lobed; lobes porrect, equal in length. *Fruiting calyx* tube strongly ribbed; about 8 mm. long; lobes oblong-spathulate, usually rounded at tip, 3-nerved, reticulate, membranous, shining, 15–20 mm. long, 4–5 mm. broad. *Fruit* capsular, broader in the middle, abruptly narrowed into long neck, longitudinally striate, densely puberulous in the upper half, $\pm$ 10 mm. long.

BORNEO: **Sabah**, Mount Kinabalu (Clemens: 40,561 Holotype — K. & duplicates in A & L, flowers pure yellow, 40,772: A & L, flowers lemon yellow, and 50,401: K).

The corolla tube is very long. Similarly stamens and style are most exserted; unlike *P. trifoliata* the style is never excentric.

In Clemens 50,401 the inflorescence is apparently abnormal being without any flowers or with flowers transformed into bracts and bracteoles.

Petraeovites kinabaluensis var. *agrestis* Munir var. nov. Fig. 10.

TYPE SPECIMEN: Sabah (Gibot 18,600 — SING).

A var. *kinabaluensis foliolis elliptico-ovatis, utrinque opacis, basi plerumque rotundatis, raro subcordulatis; foliolis medianis minoribus, brevior petiolulatis; ovario apice leviter constricto, fructu brevior apiculato, haec varietas recedit.*

Differs from the type *P. kinabaluensis* var. *kinabaluensis* in having leaflets elliptic-ovate, dull on both sides, generally rounded at base, sometimes subcordulate; middle leaflets up to 11 cm. and its petiolule upto 2.5 cm.; ovary with a slight constriction separating hairy, ridged apex from the non-hairy portions, fruit with shorter conical apex.

BORNEO: **Sabah**, Tawau near swamp forest (Gibot 18,600: Holotype — SING); **Indonesian Borneo**, Nunukun, in sandy soil (Kostermans 8,764: L, flowers greenish yellow; Meijer 2,301: L, flowers yellow).

In Gibot 18,600 the leaflets are $\pm$ elliptic with sub-cordulate base, whereas in Meijer 2,301 and Kostermans 8,765 the leaflets are ovate with rounded base. In addition there is some difference in the texture and the venation of leaves. However, similar variations are found even in the same species in other cases, and there is no reason to believe that these characters are more than ecological responses. Both the afore-mentioned specimens have the ovary slightly constricted marking the separation of the hairy, ridged apex from the non-hairy, lower portion; and the fruit in both these specimens have a shorter conical apex than those in the type form.

Otherwise the flower here resembles exactly like that in the type form.

Petraeovitex trifoliata Merr. in Phil. Journ. Sc. (1907) 425; Lam., Malay. Verb. (1919) 324 & Bull. Jard. Bot. Buit. III (1921) 97; Merr., En. Phil. Pl. III (1923) 406; Mold., Résumé Geogr. Distrib. & Syn. (1959) 184, 332 & 333. **Fig. 11.**

P. trifolia Merr. *fide*. Mold. cited (1959) 332.

P. ternata Hall. f. in Meded. Rijks. Herb. Leid: 37 (1918) 85; Lam, *op. cit.* (1919) 325 & Bull. *cit.* (1921) 97; Merr., En. Born. Pl. (1921) 518.

P. ternata Hall. f. var. *typica* Lam & var. *glabrior* Lam in Bull. Jard. Bot. Buit. III (1921) 97 & 98.

P. bambusetorum sec. Merr. *op. cit.* (1921) 518, quoad Clemens No. 10,246.

TYPE SPECIMEN: Palawan (Foxworthy B.S. 708 — PNH? not seen).

This is a peculiar species in that its flower-bearing branchlets are shortly subdivided so as to make flowers appear congested; pedicels very short, calyx and corolla puberulous within and without, mature ovary rounded at apex with excentric style, fruit striate, truncate and depressed at the summit.

A large woody climber with branchlets brown or dirty khaki coloured, pubescent when young later glabrous. *Leaves* 3-foliolate; petiole 3–7.5 cm. long; leaflets subequal, entire or slightly undulate, chartaceous or subcoriaceous, oblique, ovate to oblong-ovate, acuminate, rounded-cordulate or slightly cuneate at base, glabrous, sometimes hairy or plumose on the lower surface along the midrib towards the base; pair of nerves generally 4; middle leaflet 8–14 cm. long, 5–7.8 cm. broad, petiolule 1–2 cm. long; side leaflets upto 12 cm. long, 7.5 cm. broad, petiolule 5–15 mm. long. *Inflorescence* a terminal pyramidal panicle with lower branches axillary and also bearing terminal and lateral cymes; axillant bracts and bracteoles many, leafy, generally deciduous in early stages of the flowers. *Flowers* congested on shortly subdivided branchlets; pedicels very short. *Calyx* 5-lobed, puberulent, 8 mm. long, divided into oblong-lanceolate 4 mm. long lobes. *Corolla* tube 5 mm. long, narrowly funnel shaped, puberulent on both sides, but glabrous within below the insertion of filaments and with a band of glandular hairs near and slightly above the insertion; lobes 3 mm. long, oblong-ovate, rounded. *Stamens* 4, subequal, almost included, 4–5 mm. long; filaments slightly hairy towards base; anthers oblong, often sparsely hairy in the lobes, $\pm$ 1 mm. long. *Ovary* oblong, 3–5 mm. long, glandular, pubescent in the upper third; style 4–6 mm. long, slightly exerted, sparsely hairy towards base, terminal in young stage later excentric; stigma unequally bi-lobed. *Fruiting calyx* lobes 1.5–2 cm. long, oblanceolate-spathulate, obtuse, puberulent, 3-nerved; tube 5–8 mm. long, strongly ribbed. *Fruit* $\pm$ oblong, slightly narrowed towards base,

rounded at apex when young, later truncate and depressed at the summit, pubescent in the upper fifth, longitudinally striate, 5–7 mm. long.

BORNEO: **Sabah**, Gunong Pomatton (Korthals s.n.: L-Syntype of *P. ternata*); Batu Babie (Winkler 2,756: L — Syntype of *P. ternata* var. *typica*); Bukit Mulu (Winkler 446: L); Lahad Datu (Jaibon A3,239: SING; Muin Chai 26,691: SAN, flowers green; Brand 20,086: L, flowers yellow); Bettotan (Kloss 9,581: L); Mount Kinabalu (Clemens 10,246: L & Clemens s.n.; L; Carr 26,658: SING); Sungei Blu-u (Jaheri 512: L — Syntype of *P. ternata* var. *glabrior*); Kinabatangan (Wood A4,622: SING, L); **Sarawak**, at Niah Caves, alt. 500 ft. (Chew 307: SING); P. Laset (Slooten 2,299: L).

PHILIPPINES: **Palawan**, Puerto Princesa on Mt. Pulgor (Elmer 12,892*: A, K, E, CAL, L, BM; Fenix 15,524: K). **Mindanao**: Zamboango, Santa Maria (Reillo 16,410: K), San Ramon (Hall. 4,722: L — Syntype of *P. ternata* L, & 4,613, sterile: L).

A careful examination of types show that *P. ternata* Hall. is conspecific with *P. trifoliata*. Apparently Hallier regarded vegetative characters as to the size and hairiness of leaflets as specifically important and not merely as ecological responses; in fact wide vegetative differences may be found in the specimens of the same plant.

Further it has been seen that the shape and size of ovary and position of style also varies at different stages of growth.

Also Lam used vegetative characters to make his var. *typica* & *glabrior* for *P. ternata*.

In the specimens, Fenix 15,524: K, and Chew 307: SING, the leaflets are pubescent with irregularly dentate margins. But in the adult leaflets, both dentation and hairiness seem to vanish gradually; but, though the pubescence is unusually thick, there is no difference in the floral characters to justify their separation as a permanent form or variety. Winkler's specimen No. 231: has leaves with 4, 5 and 6 leaflets. These differences perhaps indicate its latent tendency towards the formation of biternate leaves.

Petraeovites sumatrana Lam. in Bull. Jard. Bot. Buït. III (1921) 98; Mold., Résumé Geogr. Distrib. & Syn. (1959) 188, 192, 193 & 332. **Fig. 12.**

P. elmeri Merr. in Univ. Calif. Publ. Bot. 15 (1929) 267.

TYPE SPECIMEN: Sumatra (Ajoeb in Exp. Jacobson 183 — BO not seen, Isotype — L).

Allied to *P. multiflora* in having biternate leaves, small congested flowers, exserted stamens and style, but differs in having: calyx lobes almost equal to the tube and conspicuously puberulent

*cited by Lam (1919) as of Merrill.

within and without, corolla sparsely glandular at the throat, minutely puberulent in the lobes; anther lobes $\pm$ elliptic and style longer.

A woody climber; branchlets glabrous, dark green when young, later yellowish brown. *Leaves* biternate; leaflets ovate-elliptic, entire, acuminate, rounded or slightly cuneate at base, often puberulent on the lower surface especially in the ribs, but less so later, chartaceous, 4-7 nerved; common petiole 2-4 cm. long, sparsely puberulous. Secondary terminal petiole 1.5-3 cm. long, puberulous; midleaflet upto 4.5 cm. long, 2.8 cm. broad, petiolule 1.5-2 cm. long, puberulous; lateral leaflet 2-3.8 cm. long, upto 2 cm. broad, petiolule 2-5 mm. long, puberulous. Secondary lateral petioles 5-15 mm. long, puberulous; midleaflet upto 4.3 cm. long, 2.3 cm. broad, petiolule upto 1 cm. long puberulous; lateral leaflets upto 2.8 cm. long, 2 cm. broad, petiolule 2-5 mm. long or less, sometimes sessile. *Inflorescence* axillary or terminal, a cymose panicle, upto 30 cm. long with lateral branches, $\pm$ 15 cm. through; main axis quadrangular, sparsely puberulous; cymes 5-20 mm. long, 2-5 flowered, puberulous; bracts at the base of cymes minute, linear, puberulous, $\pm$ 1 mm. long; bracteoles linear, almost half of bracts. *Flowers* small congested; pedicels 1-1.5 mm. long, puberulous. *Calyx* conspicuously puberulous outside, 2 mm. long; tube infundibuliform, 1 mm. long, glabrous within; lobes 5, almost equal to the tube, narrow, somewhat obtuse, puberulous. *Corolla* 5-lobed, glabrous outside; tube funnel shaped, sparsely glandular at the throat, 2-2.5 mm. long; lobes reflexed, minutely puberulous within in the upper half, subequal, $\pm$ 1 mm. long, obtuse. *Stamens* 4, exserted, seated in the throat or a little below, $\pm$ 2 mm. long; filaments slender, laterally compressed; anthers elliptic-oblong. *Ovary* $\pm$ oblong, puberulous at apex, faintly 4-lobed; style 5-6 mm. long, filiform, glabrous; stigma bi-lobed, lobes 0.5-1 mm. long. [*Fruiting calyx* glabrous, tube costate, 3-5 mm. long, lobes membranous, spatulate, subtrinnerved, 14-19 mm. long, 3-4 mm. broad. Fruit included in the calyx-tube: — fide Lam].

SUMATRA: **Bengkulen**: Rimbo Pengadang, alt. 1,000 m. (Ajoeb in Exp. Jacobson No. 183 — Isotype: L); Tambang Sawah (Voogd 1,062: L).

BORNEO: **Sabah**, Elphinstone Province, Tawao (Elmer 21,883 — Isotype of *P. elmeri*: SING & L).

Though there are some discrepancies in the description of *P. sumatrana* and *P. elmeri*, there is no material difference between the duplicates of the above quoted types of the species, and so I have no hesitation to treat these taxa as one. Lam described the calyx as "subglabrate" (in key) "glaber vel indistincte pulverulentus" (text), but the last word may have been a misprint for

“puberulentus”, for the calyx is actually hairy all over except in the tube within. Further Lam states that the “corolla is glabrous within and without”, (Key) whereas the corolla is glabrous outside only, and minutely puberulous in the lobes within and sparsely glandular in throat.

In *P. multiflora* the calyx lobes are practically glabrous within, the corolla is villous in the throat, anther lobes rounded and fruit 4-lobed in the top. Fruit in *P. sumatrana* is not available for study, but since its ovary is slightly 4-lobed, it is possible that its fruit may be similar to that of *P. multiflora*.

These four specimens show conclusively that the leaves are comparatively short even on the old stem. In *P. multiflora* small leaves are found only on young apical stems.

I have not seen the fruiting specimens from Bogor to which Lam had access.

Petreaovitex multiflora (J. E. Smith) Merr., Int. Rumph. Herb. Amb. (1917) 453; Lam in Bull. Jard. Bot., Buit. III (1921) 98; Bot. Mag. Tokyo 56 (1942) 114; Mold., Résumé Geogr. Distrib. & Syn. (1959) 197, 199, 201, 204, 207 & 332: var. **multiflora**. Fig. 13 & 14.

P. multiflora (J. E. Smith) Merr. var. *solomonensis* Bakh. in Journ. Arn. Arb. XVII (1935) 73: **Syn. nov.**

P. riedelii Oliv. in Hook. Ic. Pl. V (1883) 15, t. 1420 (type of the genus); Hall. f., (sub. *Petreovitex*) in Med. Rijks. Herb. No. 37 (1918) 84; Lam, Malay. Verb. (1919) 326.

P. sumatrana Lam var. *solomonensis* (Bakh.) Mold., Résumé Geogr. Distrib. & Syn. (1959) 332: **Syn. nov.**

Petrea multiflora J. E. Smith Rees, Cycl. 27: Art. *Petrea* No. 2 (1814): **basionym**.

TYPE SPECIMEN: Honimoa Island (C. Smith s.n. — Linn., not seen; Isotype — BM).

Akin to *P. sumatrana* in having biternate leaves, small congested flowers on branches of the axillary inflorescences (rarely terminal), exerted stamens & styles, but distinguished easily by its larger leaves and leaflets (occasionally pubescent in juvenile stage), glabrous calyx within, villous throat of the corolla & $\pm$ rounded anther lobes.

A tall woody climber; branchlets glabrous, dark brown or coffee coloured. *Leaves* biternate; leaflets ovate-elliptic, entire, retusely or obtusely apiculate, cuneate or subtruncate at base, in lateral leaflets sometimes cordulate, pubescent when young especially on

the nerves beneath, later glabrous, chartaceous or subcoriaceous, 6-9 nerved; common petiole 6-10 cm. long in adult leaves, glabrous. Secondary terminal petiole 3-4.8 cm. long, glabrous; mid leaflet 6.5-11 cm. long, 4-6.2 cm. broad, petiolule 1-1.5 cm. long; lateral leaflets 5-10 cm. long, 3-5 cm. broad, petiolule 2-7 mm. long. Secondary lateral petiole 2-3 cm. long; midleaflet 7-10 cm. long, 4-5.5 cm. broad, petiolule $\pm$ 1 cm. long; lateral leaflets 5-7.5 cm. long, 3-4 cm. broad, petiolule 2-4 mm. long, sometimes sessile. *Inflorescence* terminal or axillary, cymose panicle upto 50 cm. long with lateral branches; main axis quadrangular, puberulent; cymes 3-8 mm. long, puberulous; bracts at the base of cymes minute, linear, puberulous, 1-2 mm. long; bracteoles linear, almost half the length of bracts. *Flowers* small, congested, sessile or with very small pedicels. *Calyx* tomentose outside, glabrous within, 1 mm. long; tube funnel shaped; lobes 5, about one-third of the tube, deltoid. *Corolla* 5-lobed, sparsely puberulent without, villous in the throat, $\pm$ 2 mm. long; lobes rounded at apex, slightly curved inside. *Stamens* 4, exserted, subequal, seated in the throat, upto 1.2 mm. long; filaments glabrous; anther lobes $\pm$ rounded. *Ovary* puberulous at apex, glabrous below; style long, exserted, glabrous; stigma bi-lobed, lobes reflexed. *Fruiting calyx* upto 1.5 cm. long; lobes upto 1.3 cm. long, $\pm$ 3 mm. broad, oblanceolate, 3-nerved, sparsely puberulent; tube 2 mm. long, sparsely puberulent without, strongly ribbed. *Fruit* puberulent, striate, $\pm$ 1.5 mm. long, broad and 4-lobed at apex, cuneate towards base.

MOLUCCAS: **Laha** in Amboina (Forsten s.n.: L); Buru (Vriese & Teijsmann s.n.: L; Riedel s.n.: K — holotype of *P. riedelii*); Sula Islands: Mongoli at Kampong Batu (Atje in Hulstyn Exp. No. 45: L); Seram (Rutten 1,870: L); Honimoa (C. Smith in 1797: BM — Isotype of *Petrea multiflora*); Kairatu Gemba, (Kuswata & Soepadmo 59: A).

LESSER SUNDA ISLANDS: **Babar** (cultivated in Hort. Bogor: fide Lam, 1921, not seen); wild (fide Moldenke, 1959 p. 197).

NEW GUINEA: Sorong district; Remu Swamp Forest (Pleyte 721: L, flowers white & 722: L, Lae & A, flowers light brown); Roefei, along beach, open country (Pleyte 552: L, flowers white). Morobe district: Umi river, Markham valley, (Brass 32,643; L & Lae, flowers white); Bulolo (3,998: A, BRI, L & Lae, flowers pale yellow); Bupu river, (Henty 10,522: BRI, L & Lae); Monum (Millar 9,714: Lae); Lae Bot. Gard., Wild., (Millar 14,406: Lae). Loc. in cert. (Pulle 1,218: L, flowers light green); Sepik (Pullen 1,812: L & Lae); (Ledermann 6,687:

SING); South New Guinea (Versteeg 1,026: L); Nabire at Sennen (Kanehira & Hatusima 12,582: A); Cycloop mountains, (Royen & Sleumer 6,196: L & SING); Lake Sentanai (Royen & Sleumer 5,807: L); Andai (Beccari 586: L); former German New Guinea (Hellwing 387: K; Weinland 261: SING); Papua (Turner s.n.: BRI, flowers brown); New Pommerania (Schlechter 13,737: BM).

BISMARK ARCHIPELAGO: **Duke of York Island** (Bradtke 346: BRI & A); **New Britain**: Keravat river, alt. 200 ft. (Floyd 6,632: BRI, L, Lae; Mckeel 1,559: Lae); **New Ireland** at Namatanai (Peckel 503: B).

SOLOMON ISLANDS: **Bougainville Island** (Kajewski 1,686: BRI — Holotype of var. *solomonensis*, petals white, A & BM).

The leaves at the base of an inflorescence axis are generally young and not fully developed and often may show 3 to 5 leaflets. When 3, they may be said to be "pseudoleaflets", for each one will form two lateral leaflets and when 5, the two lower ones are "pseudoleaflets" and so will form their lateral "acolytes". Generally the lateral leaflets in young leaves are sessile or almost so even in the type of *P. riedelii* Oliv., though in "pseudoleaflets" petiolules may be slightly longer and in middle leaflets much longer. The lateral petiolules are unusually longer in fully developed leaves from new, non-flowering branches or in fully developed leaves on old stem. Kajewski 1,687 (type of var. *solomonensis*) has leaves only at the base of the inflorescence and these are not fully developed. In addition the calyx lobes are as in the typical *P. multiflora* in shape and size, being one-third of the calyx tube. In *P. sumatrana* to which var. *solomonensis* is said to resemble very closely and has even been reduced as a variety, has a different calyx with its lobes about equal to the tube. In view of this I do not see any reason for maintaining var. *solomonensis* as distinct from the type form.

The inflorescence may not always be terminal as originally described, though among these may be included the short, axillary branches which produce lateral, axillary and non-axillary panicles, but which usually bear some leaves at the base. Such terminal inflorescences probably continue their vegetative growth. Frequently, however, specialized flowering branches arise in the axils of current or fallen leaves on old branches; these bear no leaves whatsoever and must be regarded as lateral inflorescences, since these appear to cease their vegetative growth altogether. Moldenke (op. cit. p. 211) records this from New Zealand.

Petraeovitex multiflora (J. E. Sm.) Merr. var. **pubescens** (Warb.)
Munir stat. nov. Fig. 15.

P. pubescens Warb. in Engl., Jahrb. XIII (1891) 427; Lam, Malay. Verb. (1919) 328 & Bull. Jard. Bot. Buit. III (1921) 98; Mold., op. cit. (1959) 199 & 201: **basionym**.

TYPE SPECIMEN: Kai Island (Warburg 21,148 Holotype — BO?, Isotype — A).

Calyx externe pubescens, intus puberulens in lobis, glaber in tubo.

Differs from the type of *P. multiflora* var. *multiflora* in having small $\pm$ rotundate or sub-cordate leaflets, sparsely hairy or sub-glabrous above, pubescent beneath especially on the nerves with usually coarsely and irregularly dentate margins which tend to become entire; calyx is puberulent in the lobes, glabrous in the tube.

MOLUCCAS: **Kai Island** (Warburg 21,148 — Isoholotype: A).

Warburg, in his protolog of this taxon, stated that calyx lobes are glabrous and its tube pubescent (a statement is also repeated by Lam), but actually reverse is the case; for, though the calyx is entirely puberulent outside as in *P. multiflora*, the lobes are hairy within and the tube glabrous. In *P. multiflora* var. *multiflora* the calyx is glabrous inside but in the fruiting calyx the lobes are often puberulent inside.

The dentation and hairiness on the leaves are apparently a mark of juvenility, for later leaves tend to become both entire and almost glabrous on both sides, but so far no adult leaves were seen. These changes are apparently a result of environmental conditions and young age; as such I find no reason to maintain *P. pubescens* as an independent species.

Lam, in his key to the species (1919) 324 & (1921) 97, states "*P. pubescens* has 6 leaflets", but Warburg described the species as having biternate leaves and the isotype in Arnold Arboretum herbarium agrees with the original description. I have not seen any *Petraeovitex* sp. with six leaflets only except in *P. trifoliata* where 4, 5 and 6 leaflets may occur as an abnormality, or in *P. multiflora* var. *multiflora* 3-7 leaflets may be found when the leaves are in the process of development. Probably similar phenomenon also occurs in *P. sumatrana*, but it was not noticed in the specimens examined.

Moldenke (op. cit. p. 201) notes that this taxon is found in the former Dutch New Guinea, but among the specimens from so many herbaria I have not found anything like this; but I was not able to consult the specimens in Bogor herbarium.

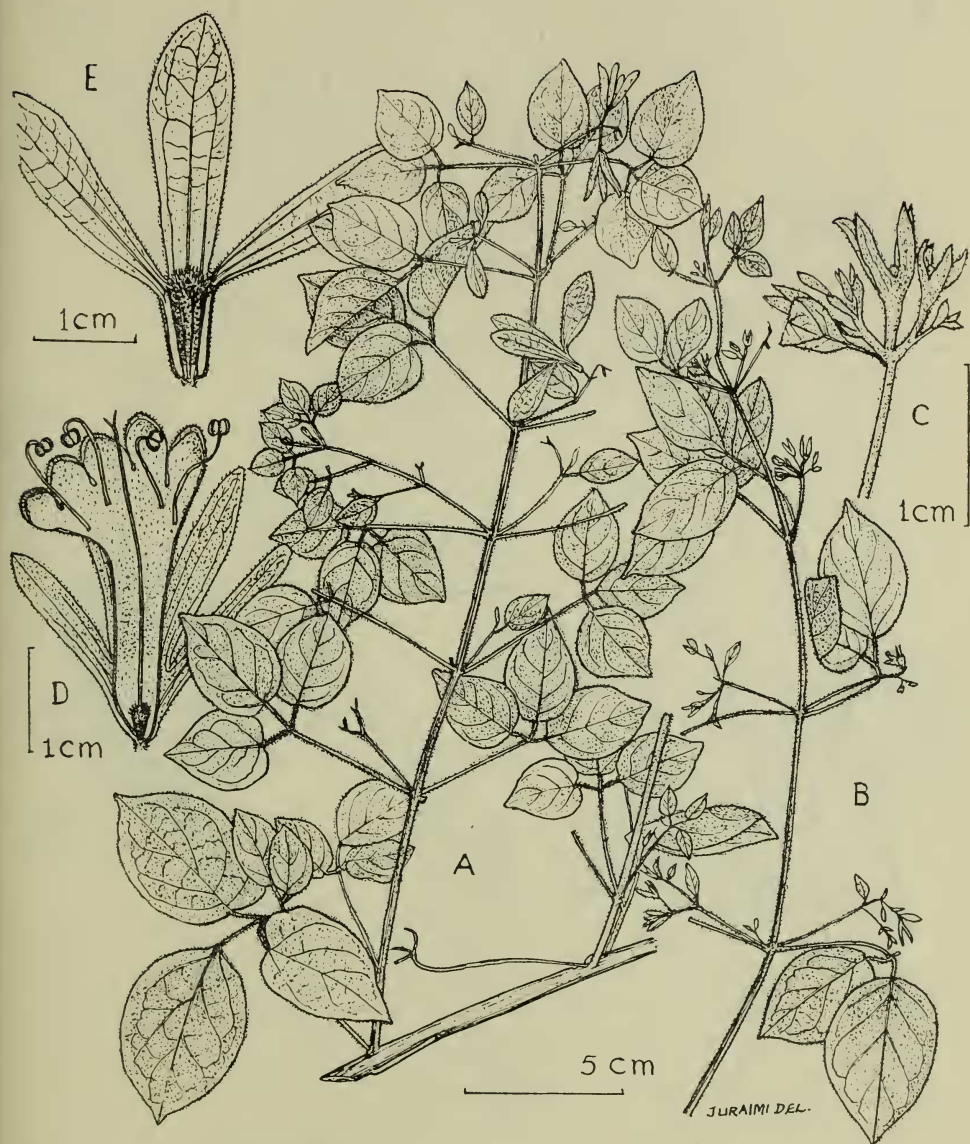


Fig. 1. *Petracovites scortechinii* (A: Nur 34,212; B-E: Symington 44,082).

A, Twig with fruits. B, Twig with flowers. C, Cyme with bracts and bracteoles. D, Flower longitudinally cut open to show stamens and ovary. E, Fruit with calyx.

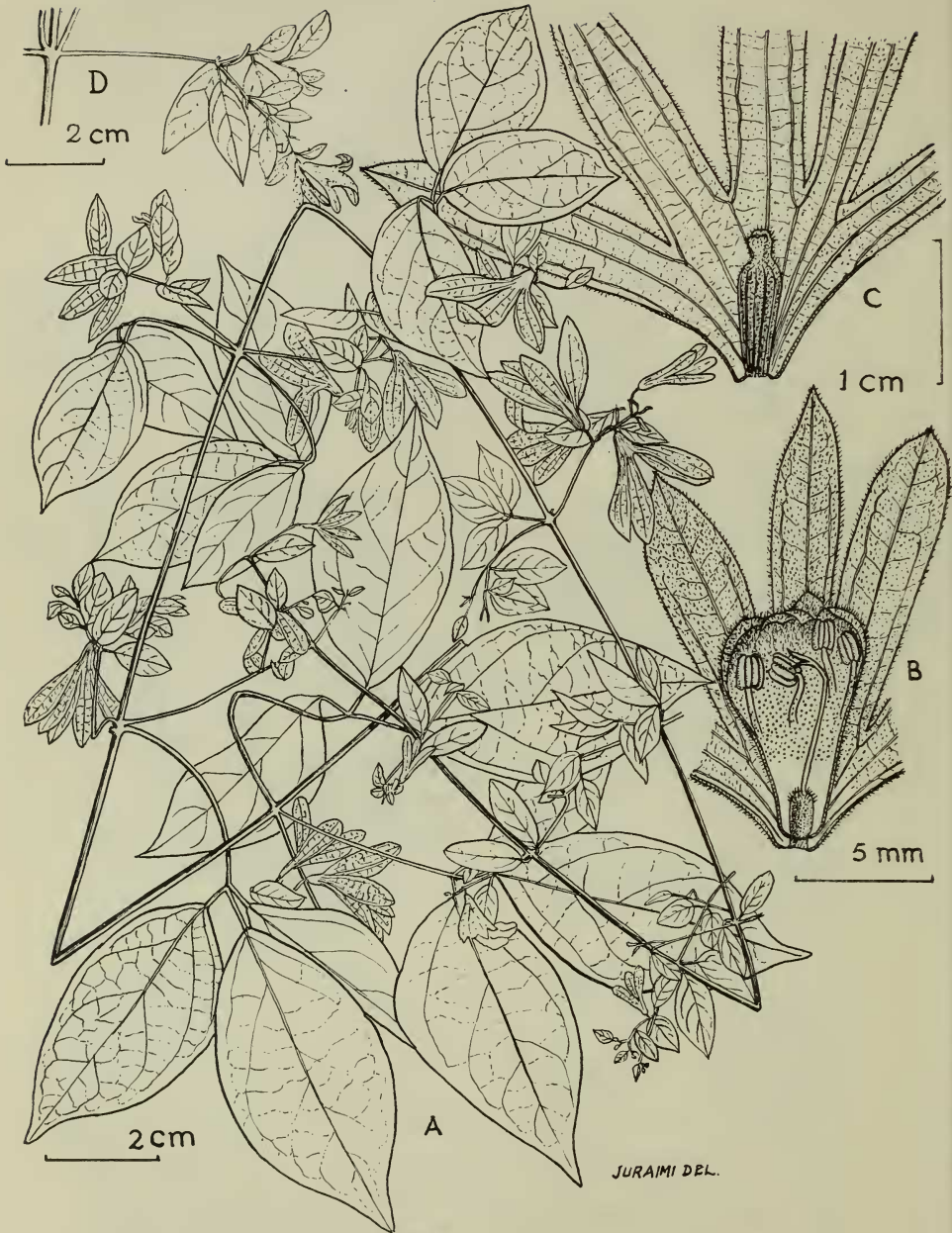


Fig. 2. *Petraeovitex wolfei* (A-C: Wolfe & Kadir 21,452 Holotype; D: Wolfe s.n.).

A, Fertile twig. B, Flower longitudinally cut open to show the inner parts. C, Fruit with the calyx cut open. D, Cyme with bracts and bracteoles.

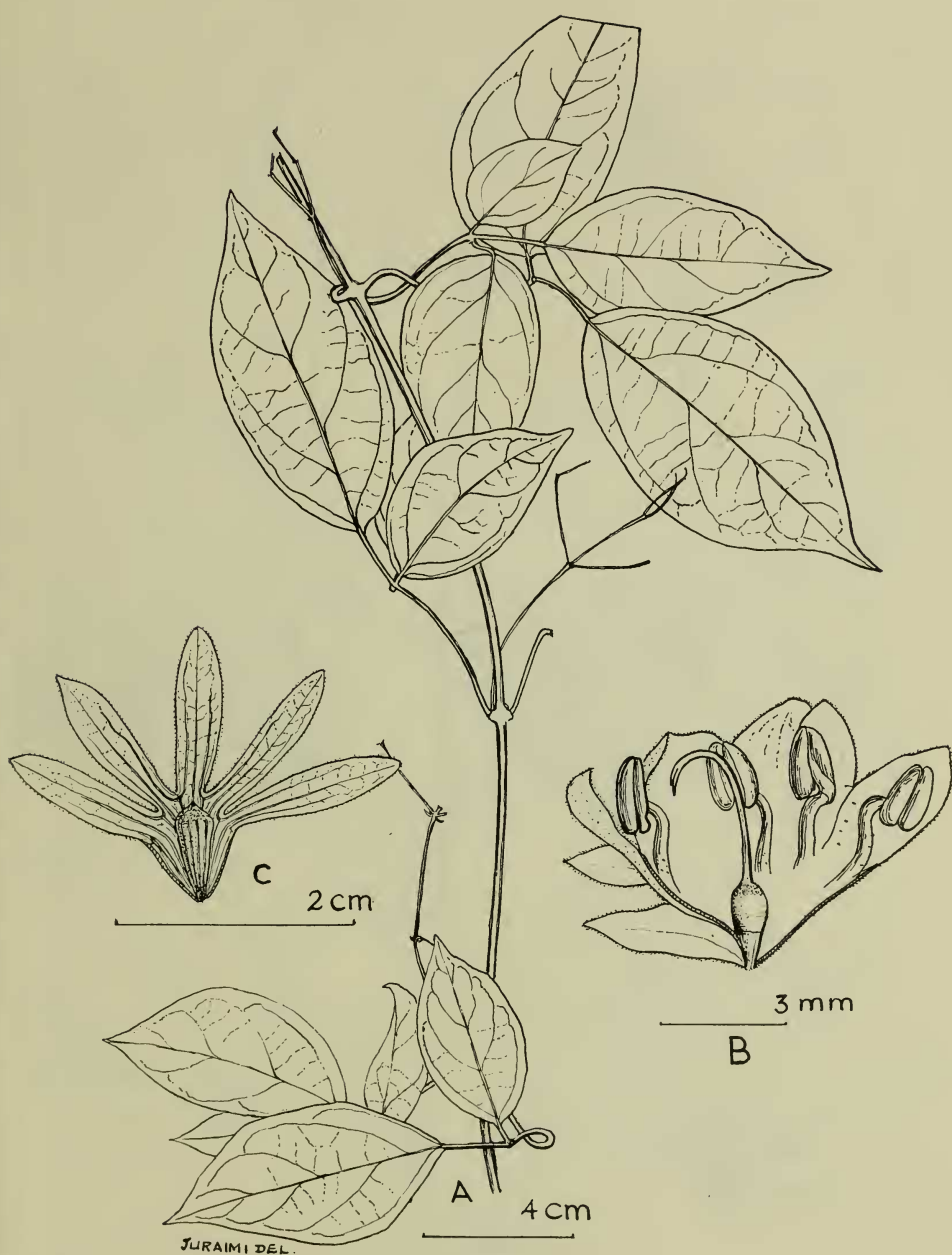


Fig. 3. *Petraeovitex membranacea* (Ramos 1,372 Isotype).

A, Fertile twig with its flowers fallen off. B, Flower longitudinally opened to show stamens and ovary. C, Fruit with its calyx longitudinally opened.

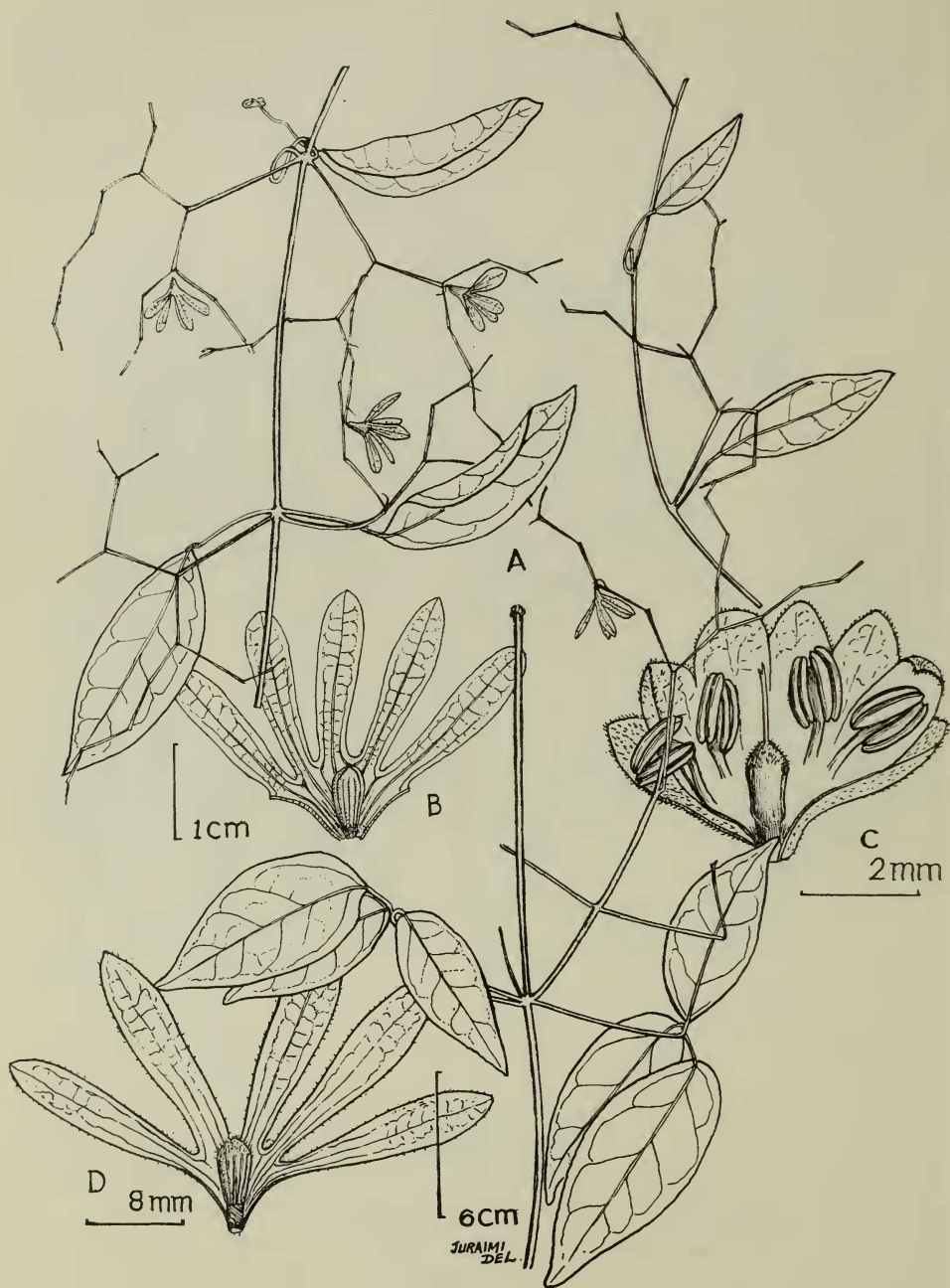


Fig. 4. *Petraeovitex membranacea* var. *malesiana* (A-B: Haviland & Hose 1913E; C-D: 1913B Holotype).

A, Twigs with infructescences. B, Fruit with its calyx. C, Flower cut open to show stamens and ovary. D, Fruit with its calyx.

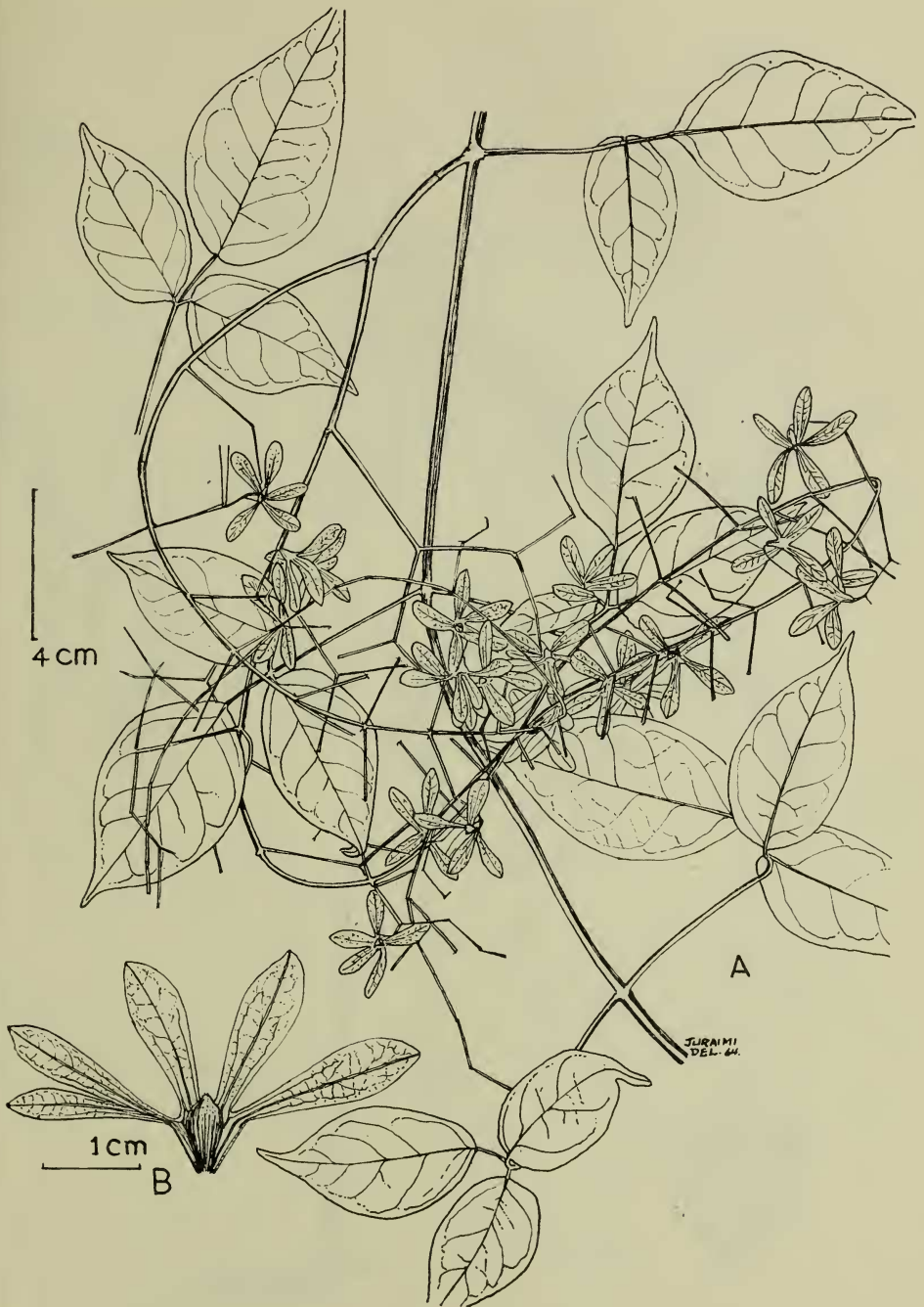


Fig. 5. *Petraeovitex membranacea* var. *malesiana* (Hume 7,877).

A, Twig with an elongate infructescence. B, Fruit with the calyx cut open.

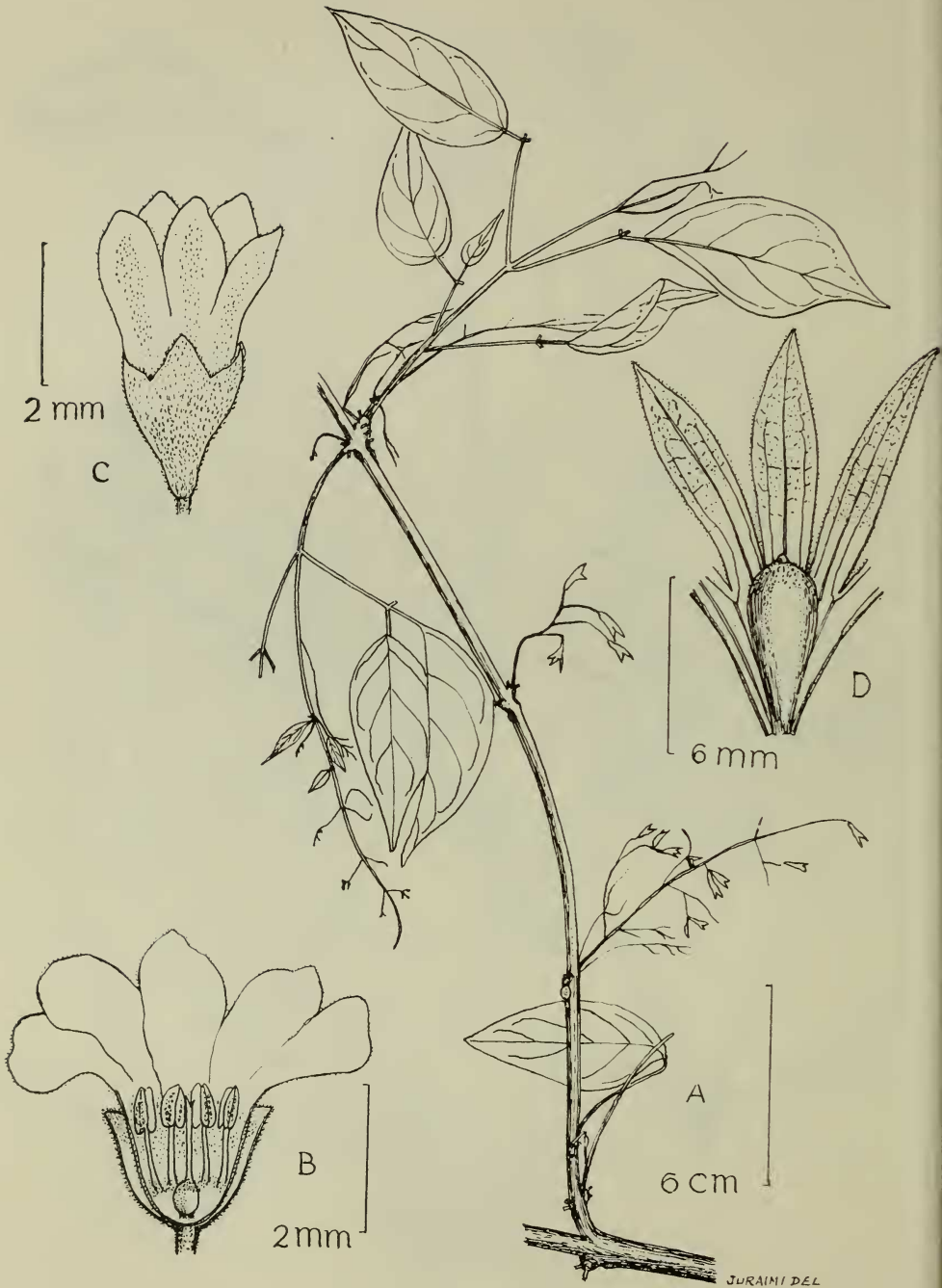


Fig. 6. *Petraeovitex bambusetorum* (King's Collector 8,765 Iso-lectotype).

A, Twig with inflorescences growing on warts produced in the axils of old fallen leaves. B, Dissected flower. C, Entire flower. D, Fruit with the calyx cut open.



Fig. 7. *Petraeovites bambusetorum* (Ridley 9,065 in SING.).

A, Twig with infructescences in the axils of current leaves. B, Fruit with the calyx cut open.

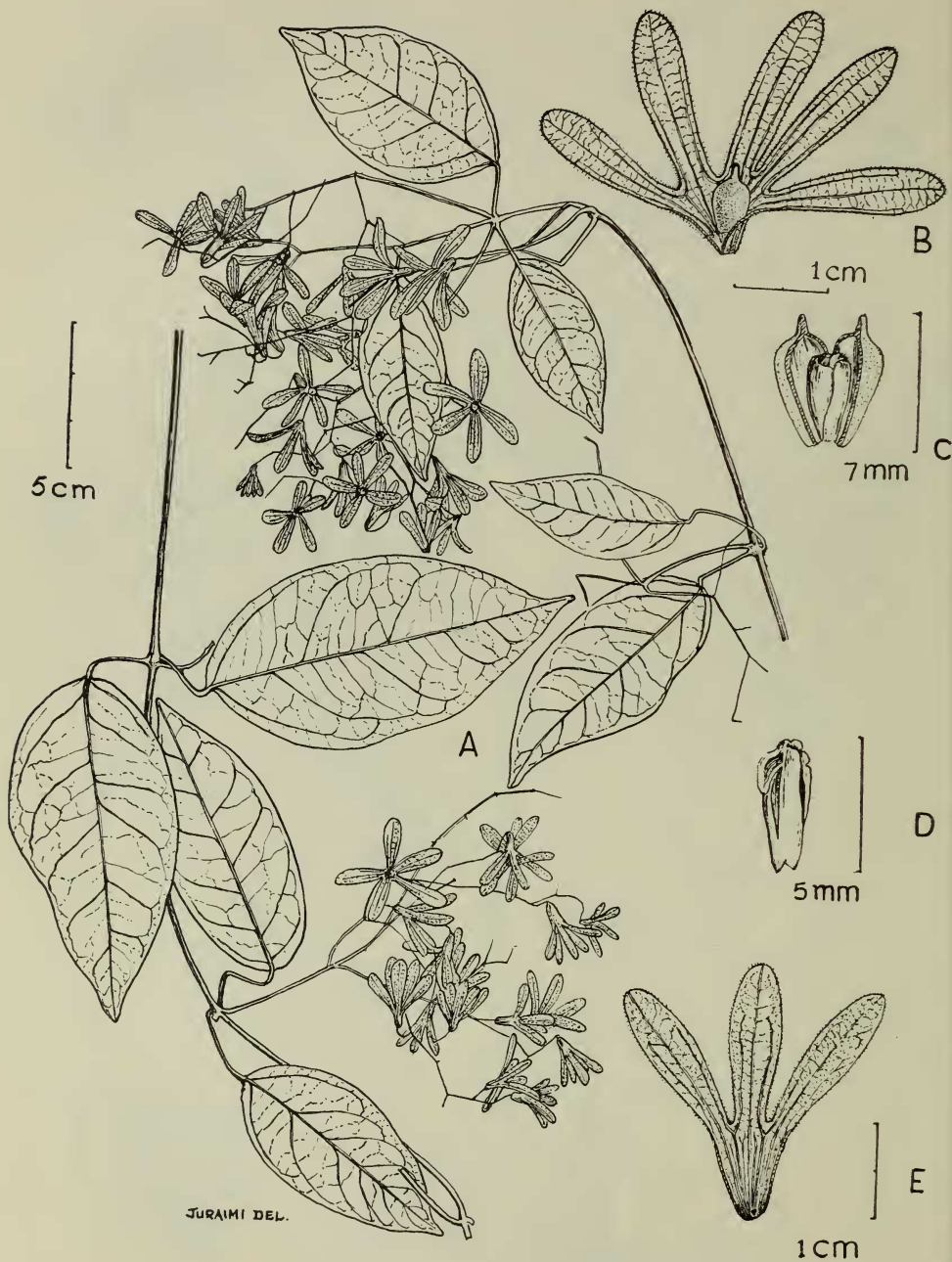


Fig. 8. *Petraeovitex bambusetorum* forma *simplicifolia* (Haviland 1,913 Holotype).

A, Twigs with simple leaves and infructescences. B, Fruit with its calyx cut open. C, Dissected fruit to show the seeds. D, Immature shrunken seed. E, External view of the fruiting calyx.

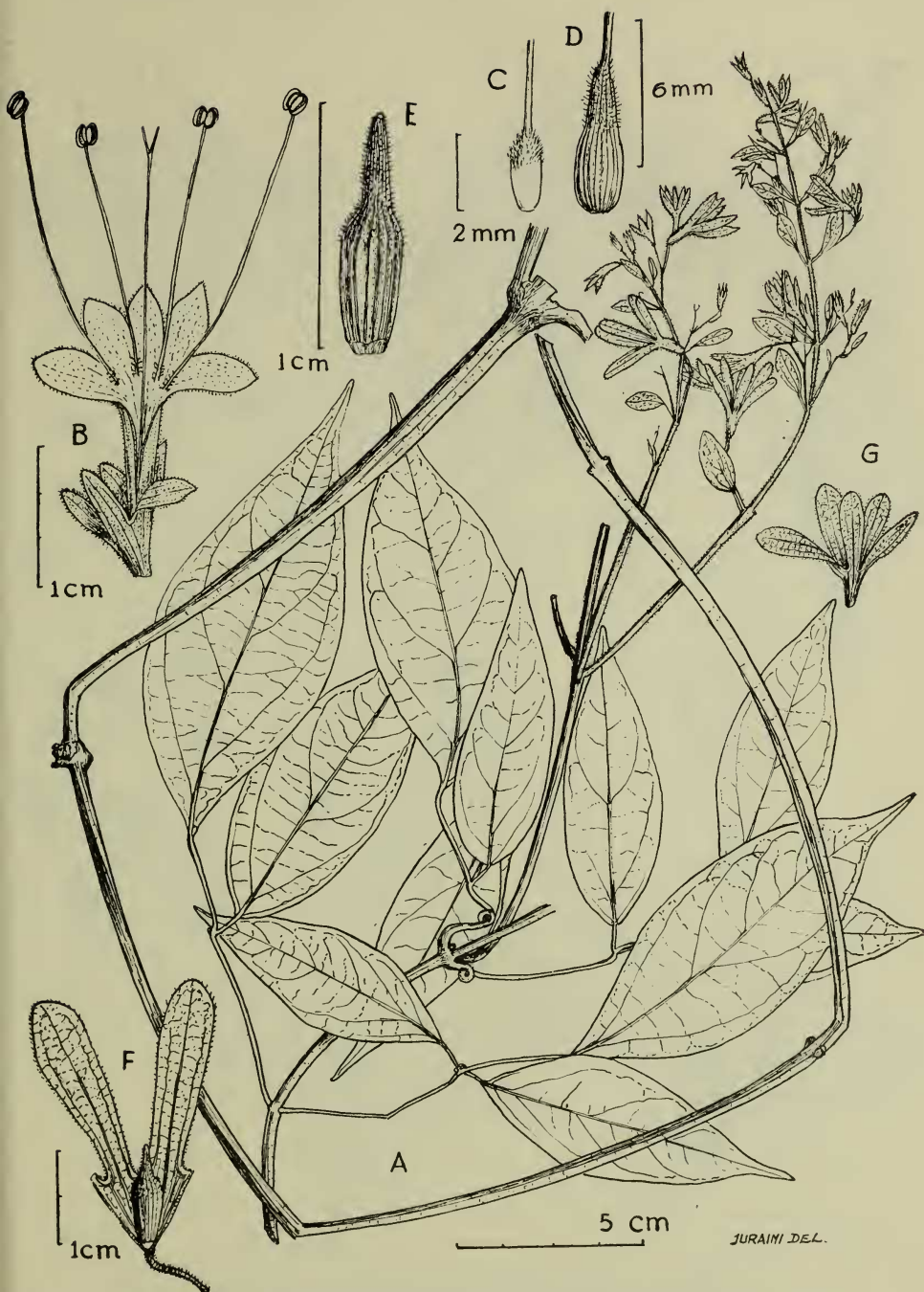


Fig. 9. *Petraeovitex kinabaluensis* (Clemens 40,561 Holotype).

A, Twig with flowers and fruits. B, Flower cut open to show the insertion of stamens. C, Ovary. D, Immature fruit. E, Mature fruit. F, Fruit with a fragment of its calyx. G, Entire fruiting calyx.

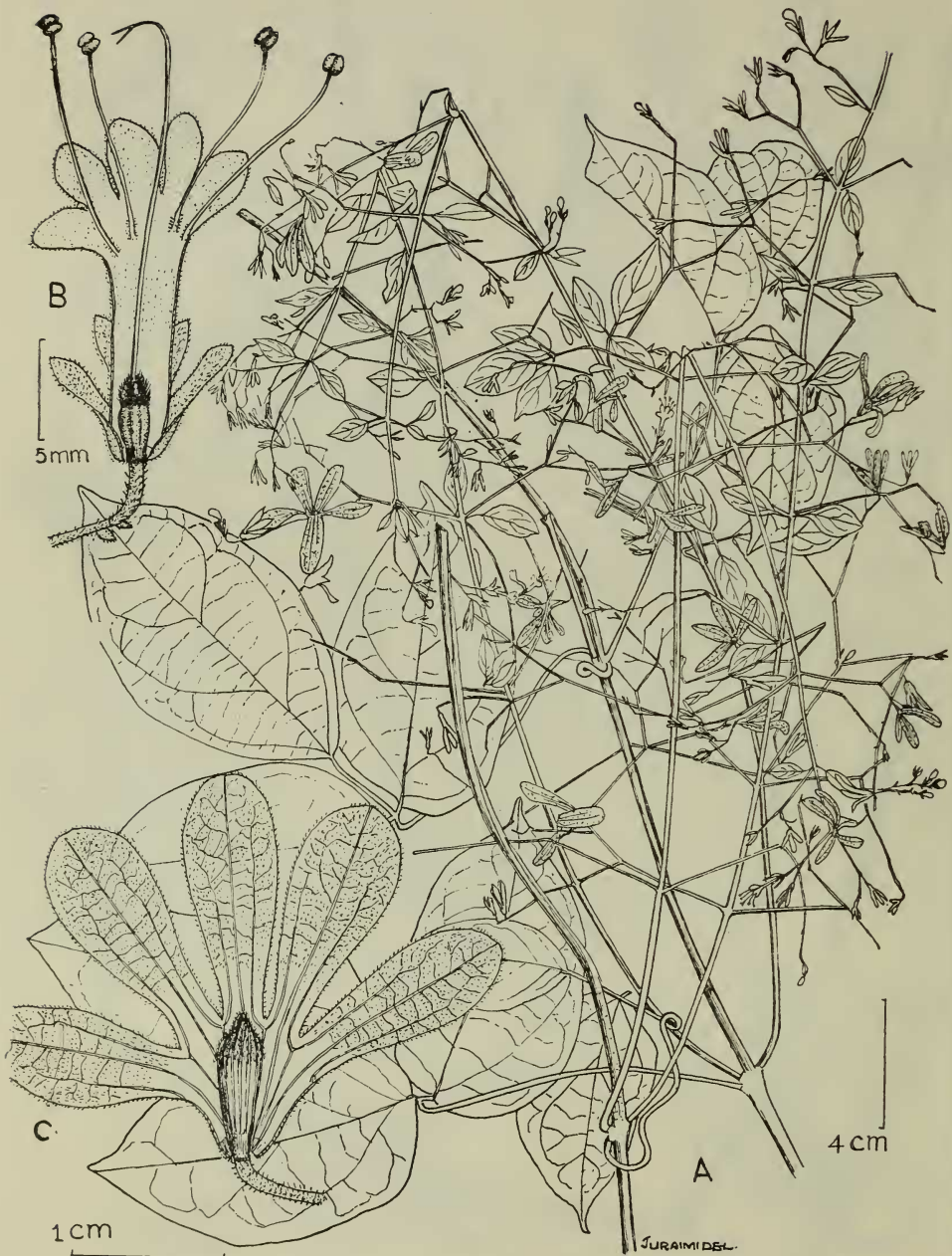


Fig. 10. *Petraeovitex kinabaluensis* var. *agrestis* (Gibot 18,600 Holotype).

A, Fertile twigs. B, Flower longitudinally opened to show ovary and stamens. C, Fruiting calyx vertically opened to show the fruit.

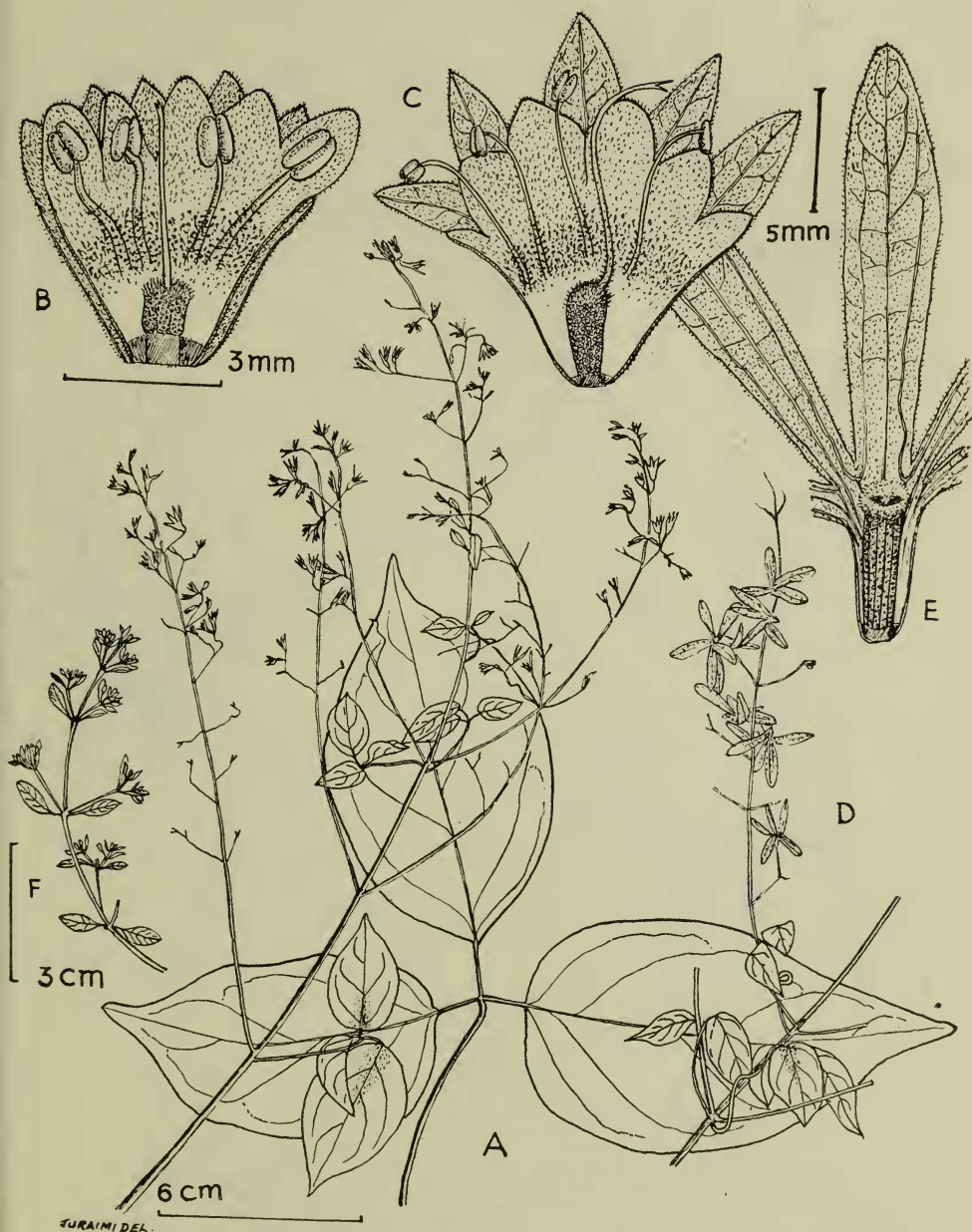


Fig. 11. *Petraeovites trifoliata* (A-E: Hallier 4,722; F: Hallier 446).

A, Leaf and inflorescence. B, Young flower cut open to show ovary and stamens. C, Mature flower with slightly exsert stamens and excentric style. D, Inflorescence. E, Fruit with its two calyx lobes. F, Fragment of a young inflorescence to show its bracts and bracteoles.

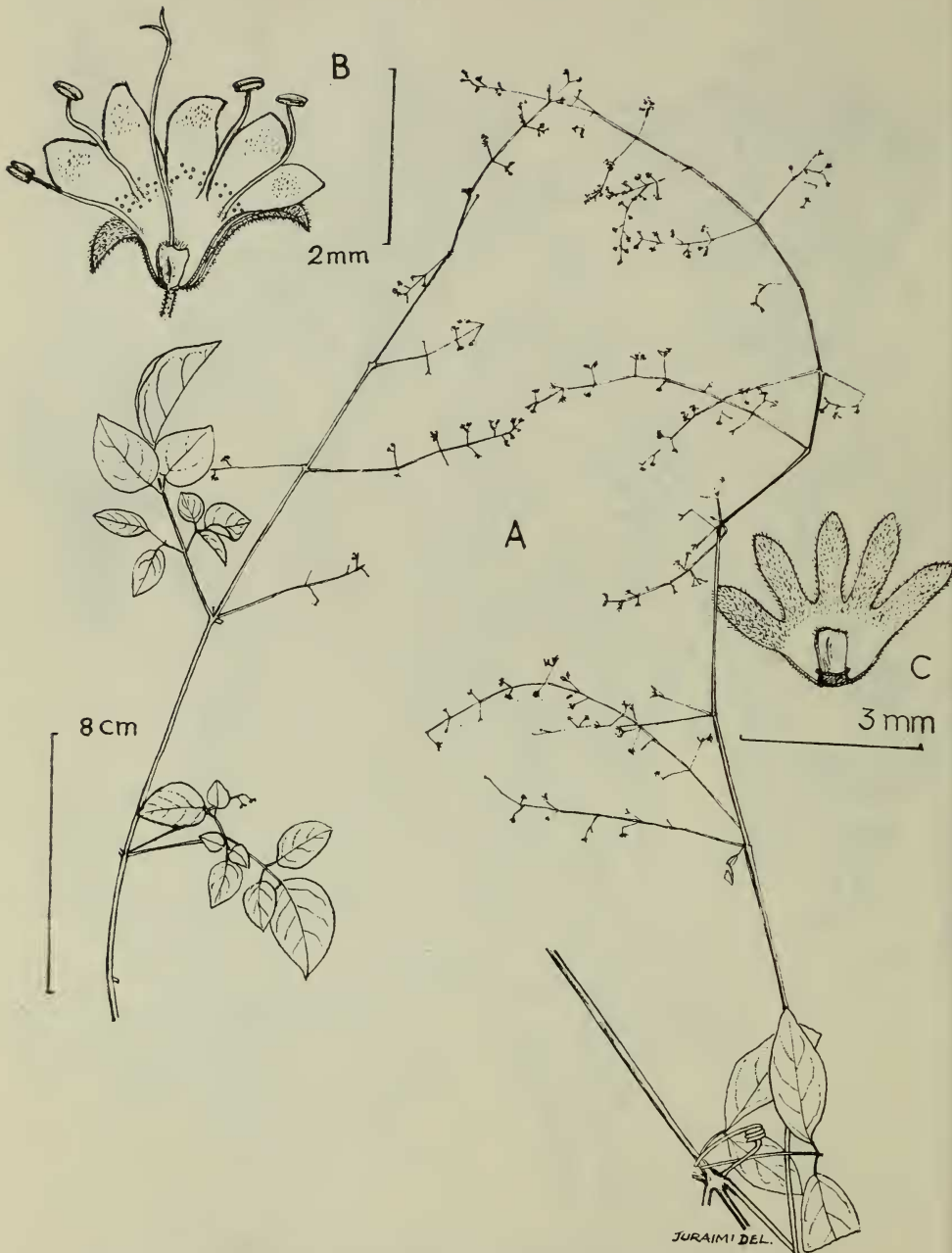


Fig. 12. *Petraeovitex sumatrana* (Ajoeb 183 Isotype).

A, Fruiting twigs. B, Longitudinally dissected flower. C, Calyx tube cut open vertically.

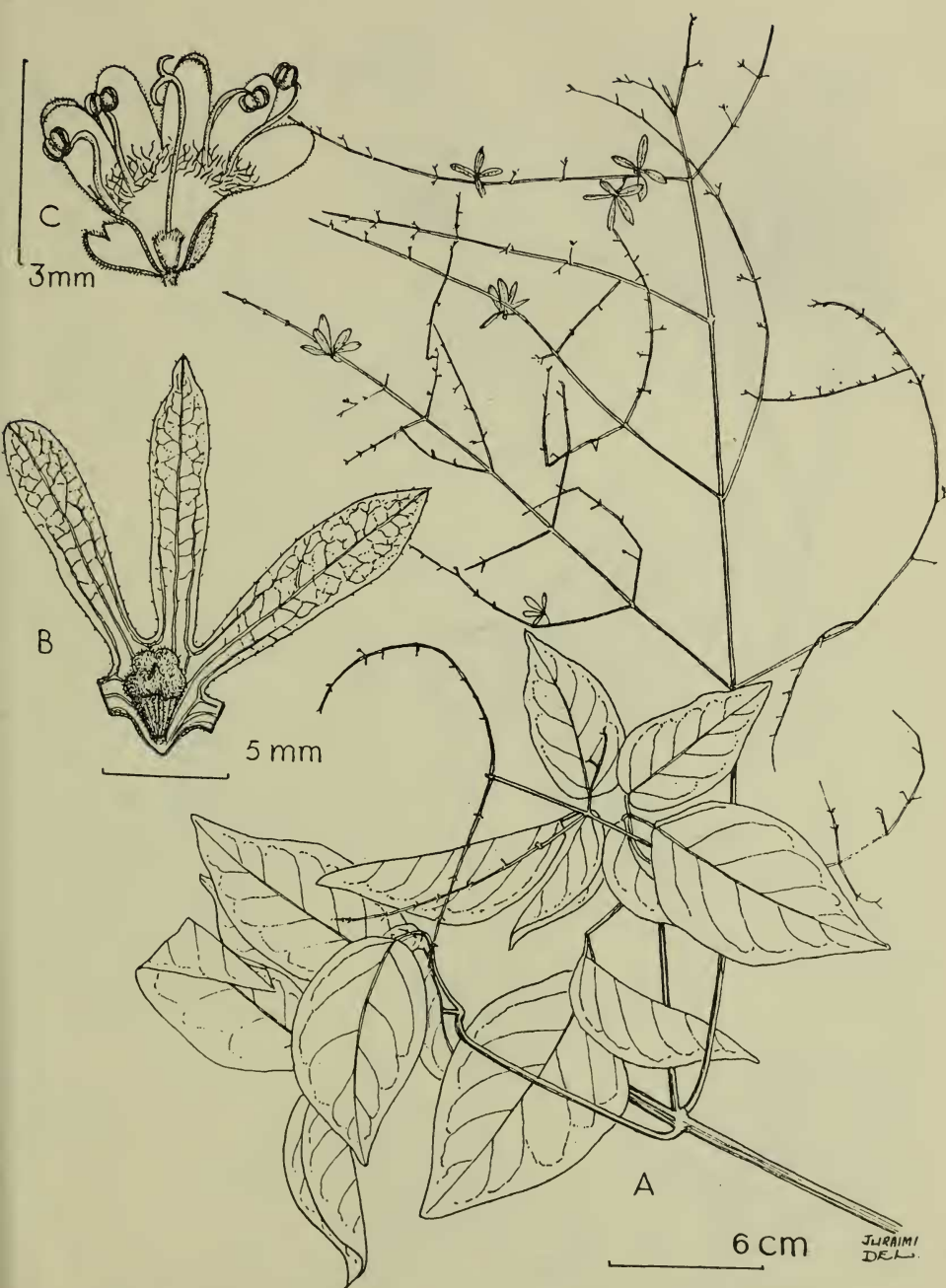


Fig. 13. *Petracovites multiflora* (A-B: Forsten s.n.; C: Kajewski 1,686).

A, Twig with the inflorescence and the axillant leaf. B, Calyx cut open to show fruit within. C, Flower vertically dissected.



Fig. 14. *Petracovites multiflora* (A: Pulle 1,218; B & C Kajewski 1,686; D: Brass 32,643).

Leaves: A, Earliest stage of leaf division; B-C, Intermediate stage; D, Fully grown leaf.



Fig. 15. *Petraeovitex multiflora* var. *pubescens* (Warburg 21,148 Isotype).

A, Flowering twig. B, Flower vertically open.